Letters concerning the northern coast of the county of Antrim. : Containing a natural history of its basaltes: with an account of ... the antiquities, manners and customs of that country. The whole illustrated by an accurate map. ... / By the Rev. William Hamilton.

LETTERS

CONCERNING THE

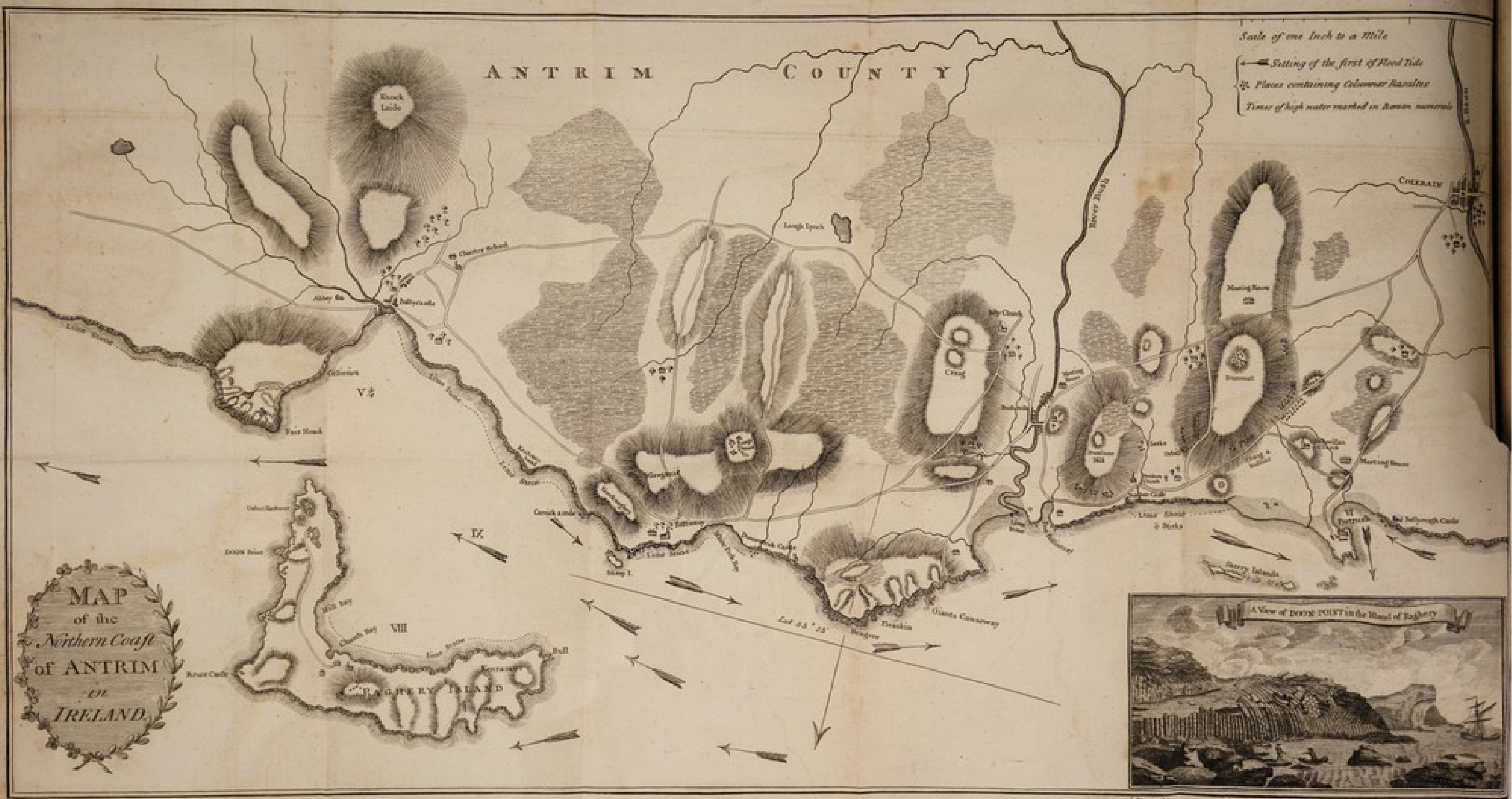
NORTHERN COAST

OF THE

COUNTY OF ANTRIM,

IN

IRELAND.


MAP of the Northern Coast of ANTRIM in IRELAND
ANTRIM COUNTY
Scale of one Inch to a Mile
Setting of the first of Flood Tide
Places containing Columnar Basaltes
Times of high water marked in Roman numerals
Knock Laide
Charter School
Ballycastle
Abbey
Fair Head
Lough Lynch
Craig
River Bush
Meeting House
Coleraine
Carrick a rede
Sheep I.
Giants Causeway
Pleaskin
Bengore
Lat. 55° 15'
Lime Stone
Portrush
Skerry Islands
DOON Point
Church Bay
Bruce Castle
Bull
RAGHERY ISLAND
V
VIII
IX
VI
A View of DOON POINT in the Island of Raghery
J Davis del.

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LETTERS

CONCERNING THE

NORTHERN COAST

OF THE

COUNTY OF ANTRIM.

CONTAINING

A NATURAL HISTORY

OF ITS BASALTES:

WITH AN

ACCOUNT

OF SUCH

CIRCUMSTANCES

AS ARE WORTHY OF NOTICE RESPECTING THE

ANTIQUITIES, MANNERS AND CUSTOMS

OF THAT COUNTRY.

THE WHOLE ILLUSTRATED BY AN

ACCURATE MAP

OF THE

COAST, ROADS, MOUNTAINS, &c.

In these LETTERS is stated a plain and impartial View of the Volcanic Theory of the Basaltes.

By the Rev. WILLIAM HAMILTON, A. M.
Fellow of Trinity College, Dublin.

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CONCERNING THE NORTHERN COAST OF THE COUNTY OF ANTRIM, IN IRELAND.

LETTER I.

Portruſh, July 20, 1784.

DEAR SIR,

MY natural curioſity, and the wiſh I had to trace the whole extent of the Baſaltes of this country, induced me to make a ſhort voyage, ſome days ago, to the iſland of Raghery, which lies ſix or ſeven miles off the north coaſt of Antrim, oppoſite to Ballycaſtle bay.

I ENJOYED a good deal of pleaſure in examining that little ſpot, which to me was almoſt a new kingdom; and if an account of it can at all contribute to amuſe an idle hour of your's, I ſhall more than double my own gratification.

THOUGH the iſland be not very remote, yet its ſituation, ſo much expoſed to the northern ocean, and the turbulence of its irregular tides, have thrown ſuch difficulties in the way of landſmen, that few have viſited it but from neceſſity; and ſome curious arrangements of the columnar Baſaltes, with which it abounds, have never been noticed except by the inhabitants.

THE chalky cliffs of Raghery, crowned by a venerable covering of brown rock, form a very beautiful and pictureſque appearance as one ſails toward them; and if the turbulence of the ſea do not reſtrain the eyes and fancy from expatiating around, ſuch a ſtriking ſimilitude appears between this and the oppoſite coaſt, as readily ſuggeſts an idea

that

that the iſland might once have formed a part of the adjoining country, from whence it has been diſunited by ſome violent ſhock of nature.

YOU, to whom demonſtration is familiar, will naturally wonder to ſee two ſhores, ſeven or eight miles aſunder, ſo expeditiouſly connected by ſuch a ſlender and fanciful middle term as apparent ſimilitude; and yet the likeneſs is ſo ſtrong, and attended with ſuch peculiar circumſtances, that I do not entirely deſpair of prevailing even on you to acknowledge my opinion as a probable one.

IT does not appear unreaſonable to conclude, that, if two pieces of land, ſeparated from each other by a chaſm, be compoſed of the ſame kind of materials, ſimilarly arranged, at equal elevations, theſe different lands might have been originally connected, and the chaſm be only accidental.—For let us conceive the materials to be depoſited by any of the elements of fire, air, earth or water, or by any cauſe whatever, and it is not likely

that this cauſe, otherwiſe general, ſhould in all its operations regularly ſtop ſhort at the chaſm.

THE materials of which the iſland of Raghery is compoſed, are accurately the ſame as thoſe of the oppoſite ſhore, and the arrangement anſwers ſo cloſely, as almoſt to demonſtrate at firſt view their former union. But to explain this more clearly, it will be neceſſary to give you a general ſketch of this whole line of coaſt.

THE northern coaſt of Antrim ſeems to have been originally a compact body of limeſtone rock, conſiderably higher than the preſent level of the ſea; over which, at ſome later period, extenſive bodies of vitrifiable ſtone have been ſuperinduced in a ſtate of ſoftneſs. The original calcarious ſtratum appears to be very much deranged and interrupted by theſe incumbent maſſes. In ſome places it is depreſſed greatly below its ancient level—Shortly after it is borne down to the water's edge, and can be traced under its

its ſurface—By and by it dips entirely, and ſeems irretrievably loſt under the ſuperior maſs—In a ſhort ſpace, however, it begins to emerge, and after a ſimilar variation recovers its original height.

In this manner, and with ſuch repeated viciſſitudes of elevation and depreſſion, it purſues a courſe of forty miles along the coaſt, from Lough Foyle to Lough Larne.

It naturally becomes an object of curioſity to enquire what the ſubſtance is from which the limeſtone ſeems thus to have ſhrunk, burying itſelf (as it were in terror) under the covering of the ocean. And on examination it appears to be the columnar Baſaltes, under which the limeſtone ſtratum is never found, nor indeed does it ever approach near to it without evident ſigns of derangement.

Thus for example:—The chalky cliffs may be diſcovered a little eaſtward from Portruſh; after a ſhort courſe, they are ſuddenly depreſſed

preſſed to the water's edge under Dunluce Caſtle, and ſoon after loſt entirely in paſſing near the baſalt hill of Dunluce, whoſe craigs near the ſea are all columnar. At the river Buſh the limeſtone recovers, and ſkims for a moment along the level of the ſea, but immediately vaniſhes on approaching toward the great baſalt promontory of Bengore, under which it is completely loſt for the ſpace of more than three miles.

EASTWARD from thence, beyond Dunſeverick Caſtle, it again emerges, and riſing to a conſiderable height, forms a beautiful barrier to White Park bay and the Ballintoy ſhore. After this it ſuffers a temporary depreſſion near the baſalt hill of Knockſoghy, and then ranges along the coaſt as far as Ballycaſtle bay.

FAIRHEAD, ſtanding with magnificence on its maſſy columns of baſaltes, again exterminates it; and once again it riſes to the Eaſtward, and purſues its devious courſe, forming, on the Glenarm ſhores, a line of coaſt the

the moſt fantaſtically beautiful that can be imagined.

If this tedious expedition have not entirely worn out your patience, let us now take a view of the coaſt of Raghery itſelf, from the lofty ſummit of Fairhead which overlooks it. Weſtward, we ſee its white cliffs riſing abruptly from the ocean, correſponding accurately in materials and elevation with thoſe of the oppoſite ſhore, and like them crowned with a venerable load of the ſame vitrifiable rock. Eaſtward, we behold it dip to the level of the ſea, and ſoon give place to many beautiful arrangements of baſalt pillars which form the eaſtern end of the iſland, and lie oppoſite to the baſaltes of Fairhead, affording in every part a reaſonable preſumption that the two coaſts were formerly connected, and that each was created and deranged by the ſame cauſes extenſively operating over both.

But it is not in theſe larger features alone, that the ſimilitude may be traced; the more minute

minute and accidental circumſtances ſerve equally well to aſcertain it.

THUS, an heterogeneous maſs of freeſtone, coals, iron ore, &c. which forms the eaſt ſide of Ballycaſtle bay, and appears quite different from the common foſſils of the country, may be traced alſo directly oppoſite, running under Raghery, with circumſtances which almoſt demonſtrably aſcertain it to be the ſame vein.

WHAT I would infer from hence is, that this whole coaſt has undergone conſiderable changes, in the courſe of ſucceſſive ages;—that thoſe abrupt promontories, which now run wildly into the ocean, in proud defiance of its boiſterous waves, have been rendered broken and irregular by ſome violent convulſion of nature;—and that the iſland of Raghery, ſtanding as it were in the midſt between this and the Scottiſh coaſt, may be the ſurviving fragment of a large tract of country which, at ſome period of time, has been buried in the deep.

But I ſhall wave this tedious ſubject for the preſent, and endeavour to compenſate for the dryneſs of this letter by ſome account of the ſtate and ſingularities of this little iſland.

In the mean time, I muſt entreat you will be ſo candid as to give me timely notice whenever my letters become dull and unentertaining—I ſhall otherwiſe loſe my labour to very bad purpoſe, as the chief object of them is to amuſe you.

I am, dear Sir, with the greateſt reſpect,

Your affectionate, &c.

LETTER

LETTER II.

Portruſh, July 27, 1784.

DEAR SIR,

THE remarkable hazineſs which has prevailed in our atmoſphere, during the whole of this ſummer, both by ſea and land, has been very unfavourable to views along the coaſt, and even in the ſhort trip I made to Raghery, gave me reaſon to be apprehenſive of miſſing our courſe, as the rapidity of the tides ſoon carries a veſſel clear of the iſland. However, with the aſſiſtance of a gleam from the meridian ſun, we got ſafely acroſs the channel, in the ſpace of two or three hours.

RAGHERY is near five miles in length, and about three quarters of a mile in breadth; toward the middle it is bent in an angle oppoſite to Ballycaſtle, and forms a tolerable bay, affording good anchorage, in deep water, with a ſtiff clay bottom; but a weſterly wind raiſes ſuch a heavy ſwell all along this coaſt, that few veſſels can ride out a gale from that quarter.

ITS tides are very remarkable.—Here it is that the great body of water which flows from the ocean during the flood tide, to ſupply the north part of the Iriſh channel, is firſt confined and broken in its courſe; and a large portion of it is returned near the weſt end of the iſland, in a counter tide, which ſupplies all the loughs and bays for the ſpace of thirty miles, running toward the weſt, along the counties of Antrim, Derry and Donegal; while in the mean time, the true tide of flood runs toward the eaſt, at the diſtance of a few miles from the coaſt, parallel to the former.

FROM ſuch eddys as this many ſingular irregularities ariſe, and in ſeveral places the tide from the weſtward, (or the flood tide, as they denominate it) appears to flow nine hours, while the ebb continues only three.

SEAMEN who are accuſtomed to navigate along this coaſt, know well how to uſe theſe different ſtreams to good purpoſe. For example:—A ſhip leaving Dublin with the flood tide (which comes into the Iriſh channel from the ſouthward) may with a leading wind reach the county of Down; there the veſſel will fall in with the northern tide of ebb, juſt then beginning to return to the ocean. With the aſſiſtance of this current, and the ſame leading breeze, the ſhip may fetch the iſle of Raghery; where a judicious pilate, inſtead of oppoſing the returning tide of flood, may drop into the northern eddy, which will carry him as far as Lough Swilly; where the true tide of ebb will again receive him, and bear his ſhip out to the weſtern ocean.

THUS

THUS by prudent management may he enjoy the advantage of four different ſucceſſive tides, all favourable to his voyage.

THE weſtern winds (which prevail here during far the greater part of the year) ſweeping with an uninterrupted blaſt over the Atlantic Ocean, roll a moſt formidable wave along this coaſt, of which I had ſome experience in croſſing to the iſland.—The day was uncommonly ſtill, not a breath of wind to ruffle the water, and yet a heavy majeſtic ſwell, ever heaving forward, ſeemed to threaten ruin to our boat, and frequently hid from view even the lofty promontory of Fairhead. From this unruffled ſurface however there was not the ſlighteſt danger to be apprehended, and our veſſel roſe and deſcended on the glaſſy wave with entire ſecurity. How changed was this ſcene in the courſe of a few hours!—The moment that the ebb began to return to the ocean, ruſhing in oppoſition to this weſtern ſwell, all was confuſion and tumult. The long wave which but juſt before rolled forward in ſilent majeſty, was now fretted

and

and broken into a tempeſtuous ſea, which the ſtouteſt boats dare not encounter, and even the beſt ſhips wiſh to avoid.

THIS alternate ſcene of peace and war takes place twice every day, and it is by attention to this circumſtance that the paſſage is made with tolerable ſecurity.

THE little ſkiff in which I navigated was built of very ſlight materials, and did not ſeem to me well calculated to buffet theſe ſtormy ſeas. I obſerved that we had received a good deal of water into it; and on expreſſing my uneaſineſs that there was no viſible means of throwing it out, one of the boatmen inſtantly took off his brogue, with which he ſoon cleared the veſſel of water, and put it on his foot again without ſeeming to feel the ſlighteſt inconvenience from the wetneſs of it, leaving me quite at eaſe on the ſubject of pumping the veſſel.

RAGHERY contains about twelve hundred inhabitants, and is rather over-peopled, as there

there is no conſiderable manufacture which might give employment to any ſuperfluous hands *.

THE cultivated land is kindly enough, and produces excellent barley. In a plentiful year ſix hundred pounds worth of this grain has been exported from it. The craigy paſturage fattens a ſmall, but delicious breed of ſheep. Even its inhoſpitable rocks ſupply to the hand of induſtry a rich ſource of wealth in the ſea weed it affords for the manufacture of kelp, which under an indulgent landlord

* From a cenſus ſince held by the prieſt of the iſland, in order to lay a tax of one ſhilling on each perſon above the age of ſixteen years, for the purpoſe of erecting a maſs houſe, it appears that the numbers amount to eleven hundred; there are one hundred and forty families, which almoſt average at the rate of eight perſons to each family. The cenſus has produced a great deal of uneaſineſs in the iſland from an opinion that one perſon will die during the year in each family ſo numbered.

often goes near to pay the whole rent of the iſland*.

THE horſes, as well as the ſheep, are ſmall in kind, but extremely ſerviceable, and

* This year an hundred tuns of kelp have been exported from Raghery, which was bought by the linen bleachers of the North of Ireland at 5l. 5s. per tun, the whole amounting to more than 525l. The annual rent of the iſland is but 600l. This entire manufacture is carried on by women and children, while the men are employed in more hazardous ſervices. At low water the ſea weed is cut from the rocks, and ſpread out before the ſun to dry; at night it is made up in little parcels, which are opened and ſhaken out again whenever the weather permits; this proceſs is continued till the weed becomes dry enough to be burnt. A hole is then made in the ground, and a little temporary kiln erected, of looſe ſtones, in which the weed is cautiouſly and gradually burned. During this proceſs the vegetable ſalt and every thing not capable of being eaſily diſſipated by the fire, melts, and coaleſces in one maſs at the bottom of the kiln. In this ſtate it is exported, no means having been yet eſtabliſhed here, or in any part of the adjoining coaſt, to purify the alkaline ſalt from the various mixtures of marine ſalt, &c. with which it abounds.

ſure-footed beyond conception. Of this I had a ſtrong proof in a little expedition which I made through the iſland in company with Mr. Gage, the hoſpitable proprietor of it. You muſt know it was but the other day the people of Raghery recollected that a road might be ſome convenience to them, ſo that in our excurſion we were obliged to follow the old cuſtom of riding over precipices, which would not appear contemptible, even to a man who enjoyed the full uſe of his legs.

It ſeems my horſe, though fifteen or ſixteen years old, had never before felt a bridle in his mouth, and after many attempts to ſhake it off, in a very critical ſituation, on the top of a rugged precipice, he refuſed to proceed one ſtep further, while this troubleſome incumbrance impeded him. Having no other reſource I was obliged to comply, and was carried over an exceeding dangerous heap of rocks, with a degree of caution which amazed me in the midſt of my terrors.

IT is ſomewhat ſingular that this iſland ſhould not contain any native quadruped, except thoſe univerſal travellers the rats*, and the little ſhrew mouſe, which is ſometimes found. But the various tribes of foxes, hares, rabbits, badgers, &c. for which it might afford excellent ſhelter, and which abound on the oppoſite ſhore, are here unknown. A few brace of hares indeed were lately introduced by the proprietor, which bid fair to produce a large encreaſe.

A GOOD many years ago Lord Antrim gave orders to his huntſman to tranſport a couple of foxes into the iſland, for the purpoſe of propagating that precious breed of animals. But the inhabitants aſſembled in

* I had ſome hope that the native black rat of this kingdom might have ſecured a retreat in this ſequeſtered iſland, but in vain, their powerful northern enemies, with the cruelty of the old Danes, but with more ſucceſs, have utterly exterminated the natives, and the rat of Norway has completely extended his waſteful dominion over Raghery.

conſternation, and having ſubſcribed each a hank of yarn, prevailed on the huntſman to diſobey orders. However he was ſharp enough to take the hint, and for ſome years paid his annual viſit to Raghery, for the purpoſe of raiſing a regular tribute, to ſave the poor iſlanders from thoſe deſolating invaders.

THE inhabitants are a ſimple, laborious, and honeſt race of people, and poſſeſs a degree of affection for their iſland which may very much ſurprize a ſtranger. In converſation they always talk of Ireland as a foreign kingdom, and really have ſcarce any intercourſe with it except in the way of their little trade.—A common and heavy curſe among them is—"May Ireland be your hinder "end."

FROM this amor patriæ ariſes their great population, notwithſtanding the perils which attend their turbulent coaſt, as they never entertain a thought of trying to better their fortune by ſettling in any of the neighbouring towns of Antrim.

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THE tedious proceſſes of civil law are little known in Raghery; and indeed the affection which they bear to their landlord, whom they always ſpeak of by the endearing name of maſter, together with their own ſimplicity of manners, renders the interference of the civil magiſtrate very unneceſſary. The ſeizure of a cow or a horſe, for a few days, to bring the defaulter to a ſenſe of duty; or a copious draught of ſalt water from the ſurrounding ocean, in criminal caſes, forms the greater part of the ſanctions and puniſhments of the iſland. If the offender be wicked beyond hope, baniſhment to Ireland is the dernier reſort, and ſoon frees the community from this peſtilential member.

IN a ſequeſtered iſland like this, one would expect to find bigoted ſuperſtition flouriſh ſucceſsfully under the auſpices of the Romiſh church; but the ſimplicity of the iſlanders does not foſter any uncharitable tenets, and contrary to one's expectation, they are neither groſsly ſuperſtitious, nor rank bigots, but have been known to hold the unchriſ-

tian

tian doctrines of their late Spaniſh prieſt in great contempt—nay in caſes of neceſſity they do not ſcruple to apply for aſſiſtance to the Proteſtant miniſter. Of their good will to the eſtabliſhed church they give an annual proof which one rarely finds in any other part of Ireland. The miniſter's tythe amounts to about 100l. per annum, and when the iſlanders have got in their own harveſt, they give the parſon a day of their horſes and cars, and bring the entire tythe home to his farm-yard.

THE chief deſideratum of the iſlanders is a phyſician, the want of whom they ſeem to conſider as their greateſt misfortune, though their maſter appears to be of a very different ſentiment; and indeed the remarkable population of Raghery makes much in favour of his opinion.

SMALL as this ſpot is one can nevertheleſs trace two different characters among its inhabitants. The Kenramer or weſtern end, is craigy and mountainous, the land in

the

the vallies is rich and well cultivated, but the coaſt deſtitute of harbours. A ſingle native is here known to fix his rope to a ſtake driven into the ſummit of a precipice, and from thence, alone, and unaſſiſted, to ſwing down the face of a rock in queſt of the neſts of ſea fowl. From hence activity, bodily ſtrength, and ſelf-dependance, are eminent among the Kenramer men. Want of intercourſe with ſtrangers has preſerved many peculiarities, and their native Iriſh continues to be the univerſal language.

THE Uſhet end, on the contrary, is barren in its ſoil, but more open and well ſupplied with little harbours; hence its inhabitants are become fiſhermen, are accuſtomed to make ſhort voyages, and to barter. Intercourſe with ſtrangers has rubbed off many of their peculiarities, and the Engliſh language is well underſtood and generally ſpoken among them.

THIS diſtinction I fear may ſeem fooliſhly ſpeculative, conſidering the diminutive object of

of it, and yet I aſſure you it is a matter of fact; and the inhabitants themſelves are ſo well aware of it, that in perilous ſituations different offices and ſtations are appointed to each, according as he is an Uſhet or Kenramer man.

RAGHERY has formerly been as it were a ſtepping ſtone between the Iriſh and Scottiſh coaſts, which the natives of each country alternately uſed in their various expeditions, and for which they frequently fought.

A NUMBER of ſmall Tumuli were lately opened in a little plain about the middle of the iſland, probably the monuments of ſo many heroes who in former ages had fallen honourably in this very field of battle. The chief himſelf lay in a ſtone coffin, and beſide him an earthen veſſel ſtood, which, by the reſiduum ſtill viſible, ſeemed formerly to have contained an offering of blood, or ſome periſhable animal ſubſtance. Within the Tumuli lay a conſiderable number of human bones, the remains of more ignoble men,

who

who might have fallen by the like fate of war.

BRAZEN ſwords, and ſpear heads of the ſame metal, found in this plain, bear ſtrong evidence of the bloody ſcenes which have been tranſacted here in remote ages. A large ſilver Fibula was found in one of the Tumuli, which is depoſited in the muſeum of Trinity College, Dublin; the workmanſhip is good, and argues conſiderable ſkill in the artiſt.

THE traditions of the country do not go beyond the obſcure period of Scottiſh and Daniſh incurſions, which have alternately ravaged and depopulated the iſland. The memory of a cruel maſſacre, perpetrated by a Scottiſh clan (I think the Campbells) remains ſo ſtrongly impreſſed on the minds of the preſent inhabitants, that no perſon of that name is allowed to ſettle in the iſland.

DURING the diſturbances in Scotland, which ſucceeded the appointment of Baliol to the crown

crown of that kingdom, Robert Bruce was driven out, and obliged to take ſhelter with a friend of his in the iſle of Raghery*. However his enemies purſued him even to this remote ſpot, and forced him to embark in a little ſkiff, and ſeek refuge on the ocean. The remains of a fortreſs are yet viſible on the northern angle of the iſland, celebrated for the defence which this hero made in it, and ſtill known by the name of Robert Bruce's caſtle. The antiquity of this building is therefore not much leſs than five hundred years; it may indeed be conſiderably older, as the time which Bruce ſpent in Raghery was ſcarce ſufficient for the purpoſe of erecting it.

One thing concerning this caſtle is worth remarking, that the lime of which it is

* Rex ipſe cum uno plerumque comite, interim ſolus, per loca maxime inculta pererrabat, et cum ne ſic quidem ſibi tutus a civium perfidiâ et hoſtium crudelitate videretur, in Æbudas, ad veterem quendam amicum tranſmiſit. It is probable this was the time when Bruce came to Raghery.—*Buchannon's Hiſt. Scot.*

built

built has been burned with ſea coal, the cinders of which are ſtill viſible in it, and bear ſo ſtrong a reſemblance to the cinder of the Ballycaſtle coal as makes it extremely probable that our information concerning the collieries of that place is far from being an original diſcovery. Indeed there is reaſon to believe that they were both well known, and extenſively wrought, at a period of time when few people imagine either the civilization or finances of this kingdom were equal to ſo expenſive an undertaking *.

* It may perhaps be imagined that the coals might have been brought from Britain; but a little reflection will ſhew that to be extremely improbable, even ſo late as the time of Robert Bruce. It was but juſt then that the Engliſh themſelves had diſcovered the uſe of ſea coal, as a fuel; and we find in the time of Edward the Firſt, that after being tried in London, they were immediately prohibited, on a haſty opinion that the vapour was noxious to the health of the inhabitants. It is not therefore to be readily believed that at this early period England could have had any extenſive export trade in coals: Or, if ſo, it muſt have been to ſome populous and civilized country, to ſome ſafe harbour, to a great and commercial town; but, at the time we ſpeak of, the Britiſh charts do not lay down a ſingle village in all this line of coaſt.

But this is a curious ſubject, and I ſhall take ſome other opportunity of giving you more information when you may not be fatigued with ſo large and I fear ſo tedious a letter.

LETTER

LETTER III.

Portruſh, July 30, 1784.

DEAR SIR,

IN my return from Raghery I ſpent a few days at Ballycaſtle, a town pretty conſiderable in this part of the world, which has been almoſt entirely the creation of one man, a Mr. Boyd, who died ſome years ago.

ACCORDING to the Perſian ſyſtem of moral duties*, it is likely Ireland cannot boaſt of an individual who has more fully diſ-

* Faire un Enfant, Planter un Arbre, & Labourer un Champ.—*Vide Monteſquieu's Perſian Letters.*

charged

charged his truſt than old Mr. Boyd; not poſſeſſed of any conſiderable fortune, not ſupported by powerful natural connexions, nor endowed with any very ſuperior talents, this man opened public roads, formed a harbour, built a town, eſtabliſhed manufactures, and lived to ſee a wild and lawleſs country become populous, cultivated and civilized.—In the moſt literal ſenſe his ſoul ſeems to have animated this little colony; in him it enjoyed life and ſtrength, and with him all vigour and animation periſhed.—By an ill-judged diſtribution of his fortune, and various untoward and unforeſeen accidents, the manufactures of glaſs were neglected, the breweries and tanneries were miſmanaged, the harbour became choaked up with ſand, and even the collieries (from particular circumſtances) are not wrought with ſuch ſpirit as the preſent proprietor would wiſh to exert.—In ſhort this gentleman conſtructed a moſt excellent machine, but unfortunately left it without any permanent principle of motion.

THE eaſtern ſide of Ballycaſtle bay terminates in the bold promontory of Fairhead.—Between this and the town lie the collieries, in an abrupt bank which overhangs the ſea: Ships however cannot derive much advantage from this circumſtance, as the unſheltered ſituation of the place, and the prevailing weſtern winds, makes a delay on the coaſt extremely dangerous, and renders it difficult to embark the coals.

THE different foſſils which generally lie above the coal, are till or ſlate-coal, iron ore, and freeſtone *.

IT

* I was very much pleaſed with the diſcovery of a natural proceſs among theſe foſſils, not very unlike our artificial one for making chryſtals of martial vitriol. You know that martial or green vitriol is a ſalt formed from the calx of iron united to the vitriolic acid, and that the component parts of ſulphur are phlogiſton, or the principle of inflammability, united to the vitriolic acid.—It ſo happens that a thin layer of iron ore lies immediately over a bed of coal; in the places where this is expoſed to the air and weather, the ſulphur of the coal becomes decom-

poſed,

It unfortunately happens that theſe beds (like moſt of the foſſils of this kingdom which are formed in layers) dip, or underlie, to the ſouthward; hence it follows, that when an horizontal adit, or level, has been puſhed forward to the bed of coal, from the ſteep bank which faces toward the north, the men, in following the mine, are obliged to work downward, and have no means of carrying off the water—whereas if the dip of the beds were in a contrary direction (that is, toward the north) the work muſt be all up hill; by which the loaded waggons would have an eaſy deſcent outward, and all the water muſt conſtantly flow off toward the ſea.

In my laſt letter I mentioned ſome reaſons which might induce one to think that theſe collieries were wrought at a very re-

poſed, loſing its phlogiſton, while its other principle, namely the vitriolic acid, uniting with the calx of the iron, forms chryſtals of green vitriol, which lie in conſiderable quantity between the two layers.

mote

mote period of time; but an accidental diſcovery has lately put that matter beyond doubt, and has laid open a very curious circumſtance in the ancient hiſtory of this country.

ABOUT twelve years ago, the workmen, in puſhing forward a new adit toward the coal, unexpectedly broke through the rock* into a cavern. The hole which they opened was not very large, and two young lads were made to creep in, with candles, to explore this new region. They accordingly went forward, and entered an extenſive labyrinth branching off into numerous apartments, in the mazes and windings of which they were at laſt completely loſt.—After various vain attempts to return, their lights were extin-

* The adit is carried along the ſide of a courſe of hard rock, which cuts all the layers of coal, running north and ſouth in a direction perpendicular to the horizon.—It is called here a Gaur or March, and I apprehend is the ſame as what the Corniſh miners call a Croſs Goſſan.

guiſhed, and they ſat down together in utter deſpair of an eſcape from this dreary dungeon.—In the mean time, the people without in the drift were alarmed for their ſafety, freſh hands were employed, a paſſage was at laſt made for the workmen, and the two unfortunate adventurers, extricated after a whole night's impriſonment.

On examining this ſubterranean wonder, it was found to be a complete gallery which had been driven forward many hundred yards to the bed of coal;—that it branched off into various chambers, where the miners had puſhed on their different works;—that pillars were left, at proper intervals, to ſupport the roof;—in ſhort, it was found to be an extenſive mine, wrought by a ſet of people, at leaſt as expert in the buſineſs as the preſent generation. Some remains of the tools, and even the baſkets uſed in the works, were diſcovered, but in ſuch a ſtate that on being touched they immediately fell to powder.

THE antiquity of this work is pretty evident from hence, that there does not remain the moſt remote tradition of it in the country; but it is ſtill more ſtrongly demonſtrable from a natural proceſs which has taken place ſince its formation, for ſtalactite pillars had been generated, reaching from the roof of the pit to the floor; and the ſides and ſupports were found covered with ſparry incruſtations, which the preſent workmen do not obſerve to be depoſited in any definite portion of time.

THE people of this place attribute theſe works to the Danes; but a very ſlight conſideration of the matter muſt ſatisfy any one that this opinion is ill-founded.—The Danes were never peaceable poſſeſſors of Ireland, but always engaged in bloody wars with the natives, in which they were alternately victors and vanquiſhed.—Like the eaſtern deſcendants of Iſhmael they ſtood at perpetual bay with all the world, their hand againſt every man, and every man's hand againſt them.

IT is not ſurely to the tumultuary and barbarous armies of the ninth and tenth centuries, whoſe harveſt of wealth and power could only be expected from the rapid and hazardous ravages of war, that we are to attribute the ſlow and toilſome operations of peace which are carried on only where population, civilization, and trade flouriſh in an extreme degree.

WHILE Ireland lay yet proſtrate, and gaſping under the fatal wounds received in a bloody ſtruggle of two hundred years, againſt theſe northern invaders, the Engliſh, under Henry the Second, made their ſucceſsful inroad, and eaſily eſtabliſhed themſelves in a feeble and diſtracted country; from which time, till the beginning of the preſent century, this iſland preſents nothing to our view but a waſteful ſcene of miſery and deſolation. That theſe collieries could have been wrought during this period ſeems extremely improbable.—We are all along execrated by the Engliſh writers as a nation of barbarians, and our country curſed as a wilderneſs

of

of foreſts and bogs.—It is not then to be ſuppoſed that a ſavage people ſhould ranſack the bowels of the earth for coal, while their woods and bogs afforded ſuch abundant fuel to their hand.

UPON the whole, during the dreary interval of near a thouſand years, from the eighth to the eighteenth century, it is in vain to look for the laboured works of induſtry and peace, in a kingdom where war was the only trade, and where all property turned on the edge of the ſword.

THE diſcovery of this colliery is one of thoſe proofs, which (without directly deciding either time or perſons) tend ſtrongly to ſhew that there was an age when Ireland enjoyed a conſiderable ſhare of civilization.—Yet, moſt of the Engliſh writers, conceiving this deſolate and diſtracted kingdom to have been naturally ſuch as they found it, eagerly pronounced it (with all the intemperate bitterneſs of enemies) to be a nation without laws, without monuments, without records, without

any

any traces whatever of former civilization: but many things which have ſtill eſcaped the wreck of time, and the fury of invaders, concur to demonſtrate this to be a haſty aſſertion.

THE round towers * of Ireland alone, are ſufficient to ſhew that we had public monuments before the arrival of the Engliſh †, which were original in their kind, and not inelegant in their ſtructure.—The remains of our ancient religious buildings which may be ſeen in the valley of Glendalough, at Clonmacnois ‡, and many other parts of the iſland, exhibit a ſpecies of architecture by no means deformed, and yet differing exceedingly both from the Grecian ſtyle of building, and from the Gothic orders which were adopted in Britain.—The few ſcattered frag-

* Of theſe there are upwards of fifty ſtill remaining.

† Turres eccleſiaſticas quæ *more patrio* arctæ ſunt et altæ, nec non et rotundæ.—*Vide Giraldus Cambrenſis.*

‡ Built anno dom. 547.—*Vide Sir James Ware.*

ments

ments of our Brehon laws, which have been recovered by our ingenious Engliſh champion, Colonel Vallancey, among many curious particulars reſpecting the preſervation of private property, inflict ſevere penalties on the perſon who ſhall injure his neighbour's trees, every ſort of which is enumerated, and even the ſhrubs and underwood are guarded by ſanctions.—It appears from hence, that there was a time when this iſland was not a kingdom over-run with foreſts and bogs; when fuel was actually ſcarce, and laws made to defend it, as the property of individuals *.

THE

* It may not appear unreaſonable to date the working of the Ballycaſtle collieries at ſuch a remote period as this, when from theſe laws of the Brehons we may naturally infer that wood was by no means a redundant article in Ireland. Though turf has been our common fuel for ſeveral years paſt, yet are there many circumſtances which muſt lead one to imagine that this ſubſtance has been entirely generated within theſe laſt thouſand years, while tillage and all attention to agriculture gave place to war and rapine alone. This will not appear ſurpriſing to any perſon who conſiders that turf bog encreaſes by a proceſs much reſembling vegetation, and that the beſt land, if neglected,

may

THE numerous inſtruments of peace and war, the many curious and coſtly ornaments of dreſs*, which are every day dug out of

may by various accidents be very ſoon reduced to a ſtate of rank bog. It is indeed next to demonſtration that many of the places where turf is cut at preſent have been once arable land, veſtiges of which are diſcoverable at great depths, and wooden paleings traced many feet under the ſurface—even at this day marks of the plough appear on the ſummit of ſeveral mountains in the North of Ireland, where the great population of that country (which is at preſent better inhabited than moſt parts of Europe) has not yet ſpread itſelf. The following inſtance will ſhew how extenſive may be the encreaſe of bog in a deſolate country, even in ſo ſhort a period as two hundred years :

" When O'Donnell and Tyrone came to the relief of " Kinſale, they waſted the country as they came through " Connaught, which by means of the Earl of Clanrickard " was generally loyal ; and there is a great tract of ground " now a bog which was then plowed land, and there ſtands " the houſe of my Lord in the midſt of it. If, there- " fore, want of induſtry has in our remembrance made " one bog, no wonder if a country famous for lazineſs, " as Ireland now is, abound with them."—*Vide Letter from Mr. William King to the Dublin Society.*

* Vide Muſeum of Trin. Coll. Dub. Vide Colonel Vallancey's Collectanea de reb. Hib.

our

our fields, afford abundant proofs that the arts once flouriſhed in Ireland, and that the precious metals were not unknown here. Of the latter, many are exquiſitely wrought, many of ſuch intrinſic value as to prove that gold and ſilver once abounded in Ireland in prodigious quantity *; that there was a time when we had more than the bare neceſſaries of life, and when poverty did not compel us to pay our taxes in cattle.

THE greater part of theſe are originals in their kind, unlike any thing known at preſent, and of ſuch decided antiquity, that even their uſes and purpoſes can rarely be inferred by any analogy derived from things in uſe at this day; tending in the cleareſt manner to demonſtrate that the ancient arts and faſhions of this iſland have certainly not been borrowed from our Britiſh neighbours, at any time poſterior to the Norman conqueſt.

* Within the limits of my own knowledge golden ornaments have been found to the amount of near one thouſand pounds in value.

BUT it is not in architecture or mere mechanical works alone, that the early Iriſh ſeem to have made a tolerable proficiency.—Whoever will take the trouble to conſult ancient authors that have treated of this country, may perhaps be ſatisfied, that it has been many ages ſince, the ſeat of learning and of piety.

THE venerable Bede lived eleven hundred years ago*, and he ſpeaks of it as a rich and happy kingdom, undiſturbed by thoſe bloody wars which harraſſed the reſt of the world during the barbarous ages †;—as a land to which the nobility and gentry of Britain reſorted for their education;—as a nation which gratuitouſly afforded maintenance, books and maſters to all ſtrangers, who came thither for the ſake of learning ‡.

IT

* Bede was born A. D. 678.

† Inſulæ hujus ſitus eſt amænus, ac adverſantium exterarum carens bello nationum.—*Bede Vita S. Columbi. Cap.* 1.

‡ Erant ibidem (in Hiberniâ) multi Nobilium ſimul et Mediocrum de gente Anglorum, qui relictâ inſulâ patriâ, vel

It may perhaps be objected that the learning of theſe days was nothing but the muſty knowledge of a monaſtery, and its boaſted piety little elſe than the rank ſuperſtition of of the church of Rome. Much however may be ſaid to invalidate this opinion. The excellent and learned Archbiſhop Uſher has clearly demonſtrated that the ſupremacy of Rome was unknown to the ancient Iriſh; that the worſhip of ſaints and images was held in abhorrence, and no ceremonies uſed which

vel Divinæ Lectionis, ſeu continentioris vitæ gratiâ eo ſeceſſerunt.—Quos omnes Scoti, libentiſſime ſuſcipientes, victum iis quotidianum ſine precio, libros quoque ad legendum, et magiſterium gratuitum præberi curabant.—*Bede Hiſt. Gent. Angl. Lib.* 3. *C.* 27.

The Saxons flocked to Ireland as to a great mart for learning—hence we find this expreſſion ſo often among our writers—" ſuch a perſon was ſent over to Ireland to be " educated."—Nor is there any reaſon to wonder that Ireland, now rude and barbarous, ſhould once have been ſo full of learning and piety, when the reſt of the world was involved in barbariſm—for ſo the wiſdom of Providence ordereth it, that a ſhoot of knowledge may ſtill remain for the good of mankind.—*Vide Camden's Britannia.*

were

were not ſtrictly warranted by ſcripture; that all deſcriptions of people were allowed, and deſired to conſult the ſacred writers as their only rule of conduct; and from the paſſages quoted by their teachers, it appears that they read the *original*, as their proper authority, and often corrected the Latin text*. —In ſhort, from the evidence produced by this learned and faithful writer, we have the ſtrongeſt reaſon to conclude that this iſland enjoyed the bleſſings of a pure and enlightened piety, ſuch as our Saviour himſelf taught, unembarraſſed by any of the idle tenets of the Romiſh church; and that it is to the Engliſh invaders of the twelfth century we are chiefly indebted for the eſtabliſhment of a religion which has deluged the kingdom with blood, and been the great ſource of almoſt all its calamities.

I FEAR you may be ready to ſtart at this, as a paradox too wild and too novel to gain

* Vide a curious treatiſe of Archbiſhop Uſher on the religion of the ancient Iriſh.

credit.

credit.—Accuſe the proteſtant kingdom of England of introducing popery, with all its attendant train of miſeries, into Ireland; and applaud the Iriſh as the genuine votaries of the reformed religion?—Yet methinks when we caſt our eyes on King Henry the Second, advancing toward this devoted nation, bearing in one hand the bloody ſword of war, and in the other the iniquitous bull of Pope Adrian, granting him unlimited authority to root out hereſy, and to extend the empire of Rome *—we ſee an irrefragable argument to prove that this was not originally an iſland of popiſh ſaints, and that the juriſdiction of Rome was not unqueſtionably eſtabliſhed here; ſince it does by no means accord with the principles of that court, to ſacrifice its obſequious votaries to the ambition of a proud prince, who ſeemed but ill ſuited to accommodate himſelf implicitly to the papal authority.

* To Ireland alſo by King Henry (Le Fitz
Of Maude, daughter of firſt King Henry)
That conquered it for their great hereſy.

Vide Harding's Chron. C. 241.

In fine, many and unequivocal circumſtances concur, to prove, that during the barbarous ages, when the reſt of Europe was involved in all the horrors of bloodſhed, ignorance and ſuperſtition, this ſequeſtered iſland enjoyed the bleſſings of peace, of learning, and of a pure religion, and was literally the happy country deſcribed in the following lines by St. Donatus, biſhop of Etruria, who died in the year 840.

" Far weſtward lies an iſle of ancient fame,
" By nature bleſs'd, and Scotia* is her name;
" An iſland rich—exhauſtleſs is her ſtore
" Of veiny ſilver and of golden ore;
" Her fruitful ſoil for ever teems with wealth,
" With gems† her waters, and her air with
" health.

* The ancient name of Ireland.—*Vide Bede and others in many places.*

† Pearls are ſtill found in many rivers of Ireland, ſome of them very valuable.—*Vide Muſeum of Trin. Coll. Dub.* —*Vide an Account of the Pearl Fiſhery of Ireland by Sir Robert Reding.*

" Her

" Her verdant fields with milk and honey flow,
" Her woolly fleeces vie with virgin ſnow ;
" Her waving furrows float with bearded corn,
" And arms and arts her envy'd ſons adorn.

" No ſavage bear with lawleſs fury roves,
" No rav'ning lion thro' her ſacred groves,
" No poiſon there infects, no ſcaly ſnake
" Creeps thro' the graſs, nor frog annoys the
" lake.
" An iſland worthy of its pious race,
" In war triumphant, and unmatch'd in peace*."

I remain your's.

* Finibus occiduis deſcribitur optima tellus,
Nomine, et antiquis Scotia ſcripta libris.
Inſula dives opum, gemmarum, veſtis, et auri ;
Commoda corporibus aere, ſole, ſolo.
Melle fluit, pulchris et lacteis Scotia campis,
Veſtibus atque armis, frugibus, arte, viris.
Urſorum rabieis nulla eſt ibi ; ſæva Leonum
Semina nec unquam Scotica terra tulit.
Nulla venena nocent, nec Serpens ſerpit in herba ;
Nec conqueſta canit garrula Rana lacu.
In qua Scotorum gentes habitare merentur,
Inclyta gens hominum milite, pace, fide.

Vide Hibernia Dominicana, page 8.

LETTER IV.

Portruſh, Auguſt 3, 1784.

DEAR SIR,

IN riding from Ballycaſtle to Portruſh, I went a ſhort way off the beaten road, to ſee a whimſical little fiſhing rock, connected to the main land by a very extraordinary flying bridge; it is called Carrick-a-rede, (or the rock in the road) and lies ſomewhat eaſtward from Ballintoy, on a moſt romantic ſhore.

I WAS quite delighted with the pictureſque appearance of this little fanciful fiſhery, of which I muſt beg leave to give you a ſhort account: However, as I am a great advocate

in favour of Mr. Lock's ſyſtem of a dictionary of pictures, in preference to a dictionary of tedious deſcriptions, I ſhall encloſe you a drawing of Carrick-a-rede, from a ſketch which my draftſman made on the ſpot.

At a particular ſeaſon of the year the ſalmon fiſh come along the coaſt in queſt of the different rivers in which they annually caſt their ſpawn.—In this expedition the fiſh generally ſwim pretty cloſe to the ſhore, that they may not miſs their port; and the fiſhermen, who are well aware of this coaſting voyage of the ſalmon, take care to project their nets at ſuch places as may be moſt convenient for intercepting them in their courſe.

It ſo happens that Carrick-a-rede is the only place on this abrupt coaſt which is ſuited for the purpoſe.—Here then or no where muſt be the fiſhery—but how to get at the rock is the queſtion.—A chaſm full ſixty feet in breadth, and of a depth frightful to look at, ſeparates it from the adjacent land, in the bottom of which the ſea breaks with an uninterrupted

terrupted roar over the rocks; the iſland itſelf is inacceſſable on every ſide except one ſpot, where, under the ſhelter of an impending rock, a luxuriant herbage flouriſhes; but the wildneſs of the coaſt and the turbulence of the ſea make it very difficult to land here.

In this perplexity there is really no reſource, except in attempting to throw a bridge of ropes from the main land to the iſland, which accordingly the fiſhermen every year accompliſh * in a very ſingular manner. Two ſtrong cables are extended acroſs the gulph by an expert climber, and faſtened firmly into iron rings mortiſed into the rock on either ſide. Between theſe ropes a number of boards about a foot in breadth are laid in ſucceſſion, ſupported at intervals by croſs cords,—and thus the pathway is formed, which, though broad enough to bear a man's foot with tolerable convenience, does by no

* This bridge is only thrown acroſs during the time of the ſalmon fiſhery, which is carried on in the ſummer months.

means hide from view the pointed rocks and raging ſea beneath, which in this ſituation exhibit the fatal effects of a fall in very ſtrong colouring; while the ſwingings and undulations of the bridge itſelf, and of the hand rope, which no degree of tenſion can prevent in ſo great a length, ſuggeſt no very comfortable feeling to perſons of weak nerves. —Upon the whole it is a beautiful bridge in the ſcenery of a landſcape, but a frightful one in real life.

THE mode of fiſhing on this coaſt is different from any I have ſeen, perhaps it may be new to you.

THE net is projected directly outward from the ſhore, with a ſlight bend, forming a boſom in that direction in which the ſalmon come: From the remote extremity a rope is brought obliquely to another part of the ſhore, by which the net may be ſwept round at pleaſure, and drawn to the land; a heap of ſmall ſtones is then prepared for each perſon. All things being ready, ſoon as the watchman

watchman perceives the fiſh advancing to the net, he gives the watch-word *—immediately ſome of the fiſhermen ſeize the oblique rope by which the net is bent round to encloſe the ſalmon, while the reſt keep up an inceſſant cannonade with their ammunition of ſtones, to prevent the retreat of the fiſh till the net has been completely pulled round them; after which they all join forces, and drag the net and fiſh quietly to the rocks.

THE ſalmon fiſheries on the ſea coaſt, and in the rivers of the north of Ireland, have ſometimes been very productive, affording a valuable cargo for the Italian markets, during time of lent :—The abundance of fiſh may in ſome meaſure be inferred from hence, that fourteen hundred ſalmon (as I am informed) have been taken in the river Bann at once hauling the net; and what is almoſt equally remarkable, near one thouſand were caught at the ſucceeding haul. At preſent, however, the fiſheries are but ſcanty, and it

* At Portruſh the word is *tarrying*.

is the prevailing opinion, that the too great ſucceſs of the river fiſheries has undone them, by deſtroying the mother ſalmon, which ſhould be allowed free paſſage through the rivers to caſt their ſpawn.

Now that I am got upon the ſubject of fiſhing, let me tell you of an amuſing inſtance of ſagacity which I had an opportunity of ſeeing a ſhort time ago, in a water dog of this country, who had become a moſt excellent fiſher.

In riding from Portruſh to the Giant's Cauſeway with ſome company, we had occaſion to ford the river Buſh, near the ſea; and as the fiſhermen were going to haul their net, we ſtopped to ſee their ſucceſs. As ſoon as the dog perceived the men to move, he inſtantly ran down the river of his own accord, and took poſt in the middle of it, on ſome ſhallows where he could occaſionally run or ſwim, and in this poſition he placed himſelf with all the eagerneſs and attention ſo ſtrongly obſervable in a pointer-

dog

dog who *ſets* his game.—We were for ſome time at a loſs to apprehend his ſcheme, but the event ſoon ſatisfied us, and amply juſtified the prudence of the animal; for the fiſh, when they feel the net, always endeavour to make directly out to ſea. Accordingly one of the ſalmon, eſcaping from the net, ruſhed down the ſtream with great velocity, toward the ford, where the dog ſtood to receive him at an advantage.—A very diverting chaſe now commenced, in which, from the ſhallowneſs of the water, we could diſcern the whole track of the fiſh, with all its rapid turnings and windings. After a ſmart purſuit the dog found himſelf left conſiderably behind, in conſequence of the water deepening, by which he had been reduced to the neceſſity of ſwimming. But inſtead of following this deſperate game any longer, he readily gave it over, and ran with all his ſpeed directly down the river, till he was ſure of being again to ſeaward of the ſalmon, where he took poſt as before in his pointer's attitude.—Here the fiſh a ſecond time met him, and a freſh purſuit enſued; in which, after various attempts,

the

the ſalmon at laſt made its way out to the ſea, notwithſtanding all the ingenious and vigorous exertions of its purſuer.

Though the dog did not ſucceed at this time, yet I was informed that it was no unuſual thing for him to run down his game; and the fiſhermen aſſured me that he was of very great advantage to them, by turning the ſalmon toward the net; in which point of view his efforts in ſome meaſure correſponded with the cannonade of ſtones which I mentioned at Carrick-a-rede.

During the whole of the chaſe this ſagacious animal ſeemed plainly to have two objects in view, one to ſeize his game, if poſſible; and the other, to drive it toward the net when the former failed; each of which he managed with a degree of addreſs and ingenuity extremely intereſting and amazing.

It is ſomewhat unaccountable that mankind ſhould look with ſo much horror and diſguſt on any remote ſimilitude which ſome

of

of the brute creation bear to the human perſon and features, and yet dwell with pleaſure on much nearer approaches toward their prerogative faculty of reaſon—At leaſt thus much I am certain of, that we ſaw the exertions of this creature with infinite delight, and our regard for him ſeemed to encreaſe in proportion as our idea of his excellence encreaſed.—Perhaps it may be, that a conſciouſneſs of decided ſuperiority in the latter caſe, makes us obſerve the ingenuity of lower animals without the allay of any uneaſineſs from an apprehenſion of rivalſhip.

LETTER

LETTER V.

Portruſh, Auguſt 6, 1784.

DEAR SIR,

YOU would hardly believe how little remains of Iriſh hiſtory, language or cuſtoms, are to be traced in this part of the country: The revolutions which it has undergone, in conſequence of forfeitures to the Engliſh, and the encroachments of the Scots, have overturned every remnant of its original ſtate.

DURING the time that the Engliſh were endeavouring to extend their pale, in every direction from the metropolis of the kingdom, over a deſperate but diſunited enemy, the

the Scottiſh clan of M'Donalds, who by an intermarriage had got footing in Ireland, began their ravages on the northern coaſt of Antrim; and by the powerful ſupport which they received from Cantire, and the weſtern iſles of Scotland, eſtabliſhed their dominion over a tract of country near forty miles in length.

As the people of thoſe days generally followed the fortune of their chief, the greater part of the native Iriſh who ſurvived theſe bloody ſcenes, tranſplanted themſelves elſewhere; while the Scots remained peaceable poſſeſſors of the field.—Hence the old traditions and cuſtoms of the country were entirely loſt; and the few who ſpeak the Celtic language at all, uſe a kind of mixed dialect, called here *Scotch-Iriſh*, which is but imperfectly underſtood by the natives of either country.

The preſent poſſeſſors are in general an induſtrious thrifty race of people. They have a great deal of ſubſtantial civility, without much

much courteſy to relieve it, and ſet it off to the beſt advantage.—The bold ideas of rights and privileges, which ſeem inſeparable from their preſbyterian church, renders them apt to be ungracious and litigious in their dealings.—On the whole, the middling and lower ranks of people in this quarter of the kingdom are a valuable part of the community; but one muſt eſtimate their worth as a miner often does his ore, rather by its weight than its ſplendor.

THERE are three or four old caſtles along the coaſt, ſituated in places extremely difficult of acceſs, but their early hiſtories are for the greater part loſt.—The moſt remarkable of theſe is the caſtle of Dunluce, which is at preſent in the poſſeſſion of the Antrim family. It is ſituated in a ſingular manner on an iſolated abrupt rock, which projects into the ſea, and ſeems as it were ſplit off from the terra firma. Over the intermediate chaſm lies the only approach to the caſtle, along a narrow wall, which has been built ſomewhat like a bridge, from the rock to the adjoining land;

land; and this circumſtance muſt have rendered it almoſt impregnable before the invention of artillery. It appears however, that there was originally another narrow wall, which ran acroſs the chaſm parallel to the former, and that by laying boards over theſe an eaſy paſſage might occaſionally be made for the benefit of the garriſon.

THE walls of this caſtle are built of columnar baſaltes, many joints of which are placed in ſuch a manner as to ſhew their polygon ſections; and in one of the windows of the north ſide, the architect has contrived to ſplay off the wall neatly enough, by making uſe of the joints of a pillar whoſe angle was ſufficiently obtuſe to ſuit his purpoſe.

THE original lord of this caſtle and its territories, was an Iriſh chief, called Mc. Quillan, of whom little is known, except that, like moſt of his countrymen, he was hoſpitable, brave, and improvident; unwarily allowing the Scots to grow in ſtrength, until

they

they contrived to beat him out of all his poſſeſſions.

In the courſe of my expeditions through this country, I met with an old manuſcript account of the ſettlement of the Scotch here, of which I ſhall give you a ſhort extract. It will ſerve in a good meaſure to ſhew the barbarous ſtate of the inhabitants in the ſixteenth century, and the manner in which property was ſo readily transferred from one maſter to another.

The manuſcript is in the hands of the Mc. Donalds, and therefore moſt likely ſpeaks rather in their favour.

" About the year 1580, Coll. Mc. Donald came with a parcel of men, from Cantire, to Ireland, to aſſiſt Tyrconnell againſt great O'Neal, with whom he was then at war.

" In

" In paſſing through the Root * of the county of Antrim, he was civilly received, and hoſpitably entertained, by Mc. Quillan, who was then lord and maſter of the Root.

" At that time there was a war between Mc. Quillan and the men beyond the river Bann, for the cuſtom of this people was, to rob from every one, and the ſtrongeſt party carried it, be it right or wrong.

" On the day when Coll. Mc. Donald was taking his departure to proceed on his journey to Tyrconnell, Mc. Quillan, who was not equal in war to his ſavage neighbours, called together his militia or galloglogh, to revenge his affronts over the Bann; and Mc. Donald, thinking it uncivil not to offer his ſervice that day, to Mc. Quillan, after having been ſo kindly treated, ſent one of his gentlemen with an offer of his ſervice in the field.

* A term by which this north weſt part of the county of Antrim is always denominated.

" Mc. Quillan

" Mc. QUILLAN was right well pleaſed with the offer, and declared it to be a perpetual obligation on him and his poſterity. So Mc. Quillan and the highlanders went againſt the enemy, and, where there was a cow taken from Mc. Quillan's people before, there were two reſtored back: after which Mc. Quillan and Coll. Mc. Donald returned back with a great prey, and without the loſs of a man.

" WINTER then drawing nigh, Mc. Quillan gave Coll. Mc. Donald an invitation to ſtay with him at his caſtle, adviſing him to ſettle himſelf until the ſpring, and to quarter his men up and down the Root. This Coll. Mc. Donald gladly accepted; and in the mean time ſeduced Mc. Quillan's daughter, and privately married her; on which ground the Scots afterward founded their claim to Mc. Quillan's territories.

" THE men were quartered two and two through the Root, that is to ſay, one of Mc.

Quillan's galloglohs and a highlander in every tenant's houſe.

"IT ſo happened that the galloglogh, according to cuſtom, beſides his ordinary, was entitled to a meather * of milk, as a privilege.—This the highlanders eſteemed to be a great affront; and at laſt one of them aſked his landlord,—"Why do you not give "me milk as you give to the other?"—The galloglogh immediately made anſwer, "Would you, a highland beggar as you "are, compare yourſelf to me, or any of "Mc. Quillan's galloglohs?"

"THE poor honeſt tenant, (who was heartily weary of them both) ſaid, "Pray, "gentlemen, I'll open the two doors, and "you may go and fight it out in the fair "fields, and he that has the victory let him "take milk and all to himſelf."

* A veſſel commonly uſed by the old Iriſh, formed out of one ſolid piece of wood, and moſt commonly of a triangular ſhape.

"THE

"THE combat ended in the death of the galloglogh; after which, (as my manuſcript ſays) the highlander came in again and dined heartily.

"Mc. QUILLAN's galloglogh immediately aſſembled to demand ſatisfaction; and in a council which was held, where the conduct of the Scots was debated, their great and dangerous power, and the diſgrace ariſing from the ſeduction of Mc. Quillan's daughter, it was agreed that each galloglogh ſhould kill his comrade highlander by night, and their lord and maſter with them; but Coll. Mc. Donald's wife diſcovered the plot, and told it to her huſhand—So the highlanders fled in the night time, and eſcaped to the iſland of Raghery.

"FROM this beginning, the Mc. Donalds and Mc. Quillans entered on a war, and continued to worry each other for half a century, till the Engliſh power became ſo ſuperior in Ireland, that both parties made an

appeal to James the Firſt, who had juſt then aſcended the throne of England.

" JAMES had a predilection for his Scotch countryman, the Mc. Donald, to whom he made over by patent four great baronies, including, along with other lands, all poor Mc. Quillan's poſſeſſions. However, to ſave ſome appearance of juſtice, he gave to Mc. Quillan a grant of the great barony of Eniſhowen, the old territory of O'Dogherty, and ſent to him an account of the whole deciſion by Sir John Chicheſter.

" Mc. QUILLAN was extremely mortified at his ill ſucceſs, and very diſconſolate at the difficulties which attended the tranſporting his poor people over the river Bann, and the Lough Foyle, which lay between him and his new territory. The crafty Engliſhman, taking advantage of his ſituation, by an offer of ſome lands which lay nearer his old dominions, perſuaded him to cede his title to the barony of Eniſhowen. And thus the Chicheſters,

cheſters, who afterwards obtained the title of Earls of Donegal, became poſſeſſed of this great eſtate; and honeſt Mc. Quillan ſettled himſelf in one far inferior to Eniſhowen.

"ONE ſtory more (ſays the manuſcript) of Mc. Quillan—The eſtate he got in exchange for the barony of Eniſhowen was called Clan-reaghurkie*, which was far inadequate to ſupport the old hoſpitality of the Mc. Quillans. Bury Oge Mc. Quillan ſold this land to one of Chicheſter's relations, and having got his new granted eſtate into one bag, was very generous and hoſpitable as long as the bag laſted. And ſo (continues the manuſcript) was the worthy Mc. Quillan ſoon extinguiſhed."

I SHOULD not have obtruded the account of the downfal of this Iriſh chief, but that it affords ſo good a reaſon for the utter obliteration of every ancient record and monument

* It is in another place called Clancaghguikie.

in

in this part of the country; and will plead my excuſe for not adding ſomewhat to our collection of Iriſh antiquities.

LETTER

LETTER VI.

Portruſh, Auguſt 13, 1784.

DEAR SIR,

A FEW days ago, as I rode acroſs the headland of Bengore, a ſudden ſhower of rain falling very heavily, compelled me to take ſhelter in a little cabbin, which ſtands on a wild ſpot in the middle of that promontory, on a piece of land called in the Iriſh language Aird, from the loftineſs of its ſituation. —A well-looking young woman ſat by the fire-ſide ſpinning at her wheel, with a parcel of children playing round her; but, notwithſtanding her induſtrious employment, the houſe bore evident marks of poverty and diſtreſs about it.

As the rain ſtill continued, I had an opportunity of aſking ſeveral queſtions concerning the fortunes of this poor family, the hiſtory of which forms ſuch a ſimple, melancholy tale, that I cannot help repeating it to you, though methinks you will accuſe me of having brought it forward very *mal a-propos*.

THE original adventurer who ſettled in this ſolitary ſpot was called Adam Morning, a name which he got from ſome accidental circumſtance, and is deſcribed by the peaſants of the neighbouring hamlet, as a clever fellow, and an honeſt man. He held his little farm, which had never before been cultivated, at the ſmall rent of five pounds per annum, hoping ſoon to render it a valuable tenure by the probable effects of his induſtry; and on this he built the cottage which I have juſt mentioned, ſuited to his infant powers, but ſo contrived as to admit of an addition, whenever his ſucceſs in improving this barren ſoil ſhould entitle him to encreaſe his comforts.

By hard labour he ſoon reclaimed ſo much of the land as enabled him to ſow a moderate quantity of grain; but when the toils of the year were almoſt over, and a plentiful harveſt promiſed to reward his induſtry, a violent ſtorm, which was ſeverely felt over the whole kingdom, blaſted his golden hopes, and the entire produce of his farm was only ſixteen barrels of oats, out of twenty-four which he had ſowed.

This was a ſevere blow to our enterpriſing farmer, but his reſolution was not thus haſtily to be vanquiſhed;—means were found to pay his rent, a ſecond crop was ſowed the enſuing year, and his land again preſented the chearing proſpect of approaching plenty. Once more an inclement ſeaſon, bearing heavily on the unſheltered ſituation of his new fields, mocked his expectation, and the entire reward of the year's labour amounted only to a ſmall encreaſe of grain, little exceeding what he had ſowed.

FEW men in this lowly ſphere of life would have borne up againſt ſuch rude and repeated ſhocks of adverſe fortune; but the ſpirit of our humble adventurer diſdained to yield to misfortunes which were merely caſual, and which no degree of prudence could have guarded againſt.—His perſeverance was ſtill unſhaken, his health continued vigorous, and the land yet promiſed to repay him, would providence but ſmile on his endeavours.—New ways were therefore deviſed to ſave his ſinking credit; every nerve was exerted to pay his rent, and try the fortune of another year.

THERE is a ſmall bay in the promontory of Bengore, called Port na Spania*, from the wreck of one of the celebrated Spaniſh Armada, which was here daſhed to pieces.

* The path of deſcent to Port na Spania lies in the land of a peaſant who is not entitled to any part of the ſea coaſt, but he receives, as a toll on his highway, every third hundred of kelp manufactured below—and this path, dangerous as it is, yet being the only one, makes it neceſſary to comply with the demand.

It is entirely ſurrounded by a monſtrous precipice between three and four hundred feet high, and is acceſſible only by one narrow approach, which is far the moſt frightful of all the hazardous paths on this whole coaſt.

By the tenure of his farm the poſſeſſor was entitled to a quarter of this little bay, amounting to about twenty or thirty ſquare yards of wild inhoſpitable rock*.

Here Adam and his family, ſtruggling againſt their diſtreſſes, laboured hard to ſupply their wants by cutting the ſea weed from the rocks, and manufacturing it into kelp, which the linen bleachers of the country bought up at a good price; while in the mean time the farm was riſing faſt, and Ceres began again to ſmile propitious.

* The whole bay generally produces about four tons of kelp, which is ſold at the rate of from five to ſix pounds per ton.

ONE morning, as Adam and his wife were deſcending down the dangerous path, to purſue their daily toil, while they were yet talking of their growing hopes, even while the chearful proſpect was ſmiling in their view, a ſudden ſlip tumbled him headlong from the precipice, and daſhed him to pieces on the rocks below*.

HIS ſon David, the heir of his humble fortunes, had juſt then returned from the Weſt Indies, ſtill crippled under a wound which he received in the ſervice of his country on board a man of war, but prepared to aſſiſt the diſtreſſes of his father with the little prize money which had fallen to his ſhare during his voyages.

THE tar had married a pretty young woman before he went to ſea, (the ſame whom I ſaw buſied in ſpinning) but inſtead of returning to a quiet happy family, he found nothing at home

* This melancholy accident happened in the ſummer of 1783, when I was in this neighbourhood.

but

but miſery and diſtreſs, and ſaw himſelf almoſt entirely adrift in the world, with a mother, a wife and children to maintain. The death of his father had brought all the hungry creditors forward, ſo that he became heir only to the poor cottage itſelf, and the naked land which ſurrounded it. However, it was his inheritance, and as ſuch he would not part with it.

THE prize money which he had got on his cruize was for the convenience of carriage (as his wife told me) moſtly converted into plate; that is, he returned home with a ſilver watch, a large pair of ſilver knee and ſhoe buckles, and ſuch other little matters of ornament as the vanity of a ſailor, who pays a viſit to his old friends after a long abſence, commonly delights to exhibit. With theſe David ſet out for the firſt fair that happened in the neighbourhood to buy a horſe, which was abſolutely neceſſary for the cultivation of his farm. But he was not in his own element. A jockey ſoon fell in with him, and the tar gave his ſilver watch, the chief

fortune

fortune of the family, for a jaded horſe whom he afterward found, on enquiry, old enough to have ſeen the days of Lord Hawke and Conflans, being upwards of twenty years of age.

OUR young farmer, alarmed at the marks of debility which too manifeſtly ſhewed themſelves in his new horſe, and terrified leaſt he might haſtily give him the ſlip, and die in his hands, ſet out with all expedition to try his fortune at market once more; where, with the aſſiſtance of another piece of plate, he ſoon bartered his antiquated ſteed, and, under the influence of his late misfortune, purchaſed a colt almoſt as unſerviceable from his youth, as the former had been from extreme old age.

THESE calamities of the ſon were little leſs ruinous than thoſe of his father, but with this difference, that the misfortunes of the latter being ſuch as no human foreſight could have prevented, he was univerſally eſteemed and pitied by the neighbourhood; while every

body

body laughed at the ſimplicity which involved poor David in his diſtreſſes.

HOWEVER, ſome peaſants of the next village, pitying his ſituation, admitted him into what is here called a *neighbour dealing*, that is, he was allowed to join his colt in the team with three of their horſes, and the plough was alternately employed in each man's farm; by this means David has been enabled to till his inheritance, and this year a harveſt of rich hope ſeems to promiſe a reward—whether it ſhall or not reſts with Providence.

SUCH is the ſimple unadorned hiſtory of this poor family, affording an artleſs affecting picture of the accidents and diſtreſſes of humble life, which I am ſure will intereſt your feelings, and make you forget the tedioufneſs of this digreſſion from my main ſubject.

LETTER VII.

Portruſh, Auguſt 20, 1784.

DEAR SIR,

IT is a pleaſing, as well as intereſting purſuit, to obſerve the gradual advancement of mankind in any particular object of enquiry; to trace the wild ſhoot of infant philoſophy from the natural ſoil, in which it has grown rank and uncultivated, to the garden of ſcience, where it blooms in all the improved beauty and vigour which the hand of art and induſtry can add to it. In this point of view a little hiſtory of the opinions which have prevailed concerning the curious combination of pillars in this neighbourhood, called the Giants Cauſeway, may

perhaps afford you ſome amuſement; and if it do not bring with it much ſolid information concerning the operations of nature, yet it may be pleaſant enough to ſee the various attempts which men have made to explain them.

THE native inhabitants of the coaſt, as they were the earlieſt obſervers of this wonder, ſo were they the firſt to account for its production; and however rude and ſimple their theory may be, yet a little conſideration will ſatisfy us that it does not deſerve the ignominious appellation of being groſsly barbarous and abſurd. The Cauſeway was obſerved by the fiſhermen whoſe daily neceſſities led them thither for ſubſiſtence, to be a regular mole, projecting into the ſea, which anſwered for ſeveral convenient purpoſes; on cloſer inſpection, it was diſcovered to be built with an appearance of art and regularity ſomewhat reſembling the works of men, but at the ſame time exceeding every thing of the like kind which had been ſeen: And it was found that human ingenuity and perſeverance,

if

if ſupported by ſufficient power, might be abundantly adequate to its production.

THE chief defect in this ſimple analogy ſeems to have been the want of ſtrength equal to the effect; but this was ſoon ſupplied in the traditions of a fanciful people, and Fin ma Cool*, the celebrated hero of ancient Ireland, became the giant under whoſe forming hand this curious ſtructure was erected.

IT was afterward diſcovered, that a pile of ſimilar pillars was placed ſomewhere on the oppoſite coaſt of Scotland, and as the buſineſs of latitudes and longitudes was not at that time very accurately aſcertained, a general confuſed notion prevailed that this mole was once continued acroſs the ſea, and connected the Iriſh and Scottiſh coaſts together.

NEAR the end of the laſt century, when this kingdom began to revive from its misfor-

* Mr. Mc. Pherſon's more modern Fingal.

tunes under the regulations of William the Third, the ſpirit of enquiry, which the Royal Society of London had juſt then called forth, began to buſy itſelf about this ſingular and original wonder. At this period we find, among the papers of the Society, a letter from Sir Richard Bulkley to Doctor Lyſter on this ſubject, dated in the year 1693, of the merits of which you may judge by the following extract:

" CONCERNING the Giants Cauſeway.—
" Prolixity in a philoſophical deſcription I'm
" ſure you'll pardon, for I was very exact
" in getting it from a perſon that was *Rei*
" *Compos*, perhaps *Peritus*. A ſcholar, a
" maſter of arts in Cambridge, and a tra-
" veller, who went on purpoſe with the
" Biſhop of Derry to ſee it, &c.

" This whole Cauſeway (ſays the ſcholar)
" conſiſts of pillars of perpendicular *cylinders*.
" The pillars do not conſiſt of joints as you
" were informed, but each cylinder is one
" ſolid piece, only indeed in breaking it

" breaks

" breaks croſswiſe, and not lengthwiſe, which " we commonly call ſplitting. And all the " ſtones that riſe up on the ſtrand are all " cylinders, though of never ſo many dif- " ferent angles, for there are alſo four " ſquared upon the ſame ſhore*.—That the " cylinders do not conſiſt of joints is evident " from hence, that the pieces ſo broken off " have their bottoms as often convex or con- " cave, as flat or even."

THUS has this intelligent traveller demonſtrated that theſe pillars have no joints, from the very circumſtance which of all others renders their articulation moſt curious and ſurpriſing.

IN conſequence of the information which this gentleman gave of the want of joints,

* With all due deference to this Cambridge maſter of arts, who ſo ſcientifically deſcribes theſe four ſquared cylinders, he muſt have made ſome very unaccountable miſtake, or elſe matters have been ſtrangely altered ſince his time, for there is not now a ſingle pillar to be found in the whole Cauſeway which is not clearly ſeparable into very many diſtinct joints.

people

people began to compare theſe pillars with the regular foſſils then beſt known, the Entrochi, Aſteriæ, and the rock Cryſtal, which, on a diminutive ſcale, ſeemed to bear reſemblance with the larger maſſes in the Giants Cauſeway; and to this end a number of quæries were drawn up by Sir Richard Bulkley, which, with their anſwers by Doctor Samuel Foley, are publiſhed in the Philoſophical Tranſactions of that period.

SUCH are theſe following:

"ARE any of the pillars hexagons, or "ſquares? or be they pentagons only?"

"HAVE the tops of the pillars any gravings "or ſtriate lines on them?"

"Is the ſuperficies caniculate or otherwiſe "grooved?" &c. &c.

ALL which quæries, though truly enough anſwered, yet produced very little uſeful information; being entirely directed to the mere

mere exterior appearance of the Cauſeway itſelf, without paying any attention to the general features of the coaſt, to the attendant foſſil ſubſtances, or even to the nature and chemical properties of the ſtone itſelf, which is utterly different from thoſe foſſils with which it was then compared. However, the Britiſh philoſophers ſeem to have purſued the analogy of this ſpecies of cryſtallization with very great confidence; ſo that the authors of the late appendix to their Encyclopædia have endeavoured to give it an air of probability, by delineating many of the baſalt pillars as terminating in pyramids, like the common rock cryſtal, and ſome ſpecies of ſalts*.

To theſe anſwers a ſketch was added, of which an engraving is publiſhed in the Phi-

* This repreſentation of the pillars has probably been taken from a drawing of the baſaltes of Saxony, ſent many years ago to Geſner, together with a deſcription of that ſpecies of ſtone by Kentman: This drawing contains many errors, and among the reſt exhibits pillars of baſaltes with conical terminations.

loſophical

loſophical Tranſactions; entitled, "A Draught "of the Giants Cauſeway which lies near "Bengore Head, in the County of Antrim, "by Chriſtopher Cole. A. D. 1694." Of this drawing and its imperfections, the account which Doctor Foley himſelf gives will be the beſt deſcription.—"He tells me he "has not drawn the Giants Cauſeway as "a proſpect, nor yet as a ſurvey or platform, "for this he thought would not anſwer his "deſign; and that he has no name for it "but a draught, which he took after this "ſort. He ſuppoſed the hills and cauſe-"way to be epitomiſed to the ſame height "and bigneſs the draught ſhews them, and "this he fancied the moſt intelligible way "to expreſs it.

Doctor Thomas Molleneux was the firſt perſon who took any very conſiderable pains to procure information concerning the Giants Cauſeway, and we have reaſon to lament that the neceſſary attendance of his profeſſion prevented him from making his obſervations in perſon, for which he ſeems to have

have been well qualified: However, his intelligence was the beſt that had yet been collected. It was found that this ſpecies of ſtone was not confined to the Giants Cauſeway alone, but might be diſcovered in the mountain of Dunmull; nay that it was certainly of the ſame ſpecies with the Lapis Miſneus, or baſaltes of Stolpen, in Saxony, of which a ſlight deſcription had been given by Agricola, in his Hiſtory of Foſſils.

By the influence of this gentleman in the Dublin Society, that body employed a painter of ſome eminence to make a general ſketch of the coaſt near the Cauſeway; but neither the talents nor fidelity of the artiſt ſeem to be at all ſuited to the purpoſe of a philoſophical landſcape.

An engraving of this is publiſhed under the following title:

"A true Proſpect of the Giants Cauſe-
"way near Bengore Head, taken from the
"North Weſt, by Edward Sandys, A. D.
"1696,

" 1696, at the Expence of the Dublin So-
" ciety.

" Right Hon. Sir Cecil
" Week, Knt. } Preſident.

" Rev. Dr. Aſhe, Biſhop
" of Cloyne,
" William Molleneux, Eſq; } Vice-Preſi-dents."

In this *true* proſpect, the painter has very much indulged his own imagination at the expence of his employers, inſomuch that ſeveral tall pillars in the ſteep banks of this fanciful ſcene appear loaded with luxuriant branches, ſkirting the wild rocky bay of Port Noffer * with the gay exhibition of ſtately foreſt trees. In the back ground he diſcovered a parcel of rude and uſeleſs materials, which his magic pencil ſoon transformed into comfortable dwelling-houſes, and for chimneys he has happily introduced ſome detached pillars of baſaltes, which from their peculiar ſituation, and the name given to

* This bay lies immediately eaſtward from the Cauſeway. I have here written the name nearly as it is pronounced by the natives, who have ſcarce any knowledge of the Iriſh language; but the proper mode of writing it ſhould be Port na Bfathach, which ſignifies the Giants Port.

them

them by the peaſants of the country, naturally excited the attention of this extraordinary artiſt. And thus were concluded the labours of the laſt century concerning this curious work of nature.

FROM that period, the baſalt pillars of this kingdom paſſed almoſt unnoticed for half a century, and ſeem to have been viewed cautiouſly, and as it were at a diſtance, by men of ſcience, who appeared ſlow to engage with an object which had hitherto entirely baffled the attempts of every theoriſt.

IN the year 1740 Mrs. Suſannah Drury made two very beautiful and correct paintings of the Giants Cauſeway, which obtained the premium appointed for the encouragement of arts in Ireland; and theſe drawings being ſoon after engraved by the hand of an eminent artiſt, and publiſhed, the attention of the world was once again directed toward this antiquated ſubject.

SHORTLY after this, Doctor Pococke, a gentleman of conſiderable induſtry in philoſophical

phical purſuits, made a tour through the county of Antrim, and was the only perſon who appears to have taken a general view of the coaſt, of which he has given a curſory deſcription. But not content with a plain hiſtory of matters of fact, the learned Doctor ventured to ſtart a new theory of his own, which I fear will not ſtand the teſt of a critical examination: To ſay the truth, it is little elſe than the doctrine of the Atoms of Epicurus in a modern dreſs *.

He conceives that the baſaltes might once have been ſuſpended in a watery medium, either in ſolution, or as a kind of mud: That at certain times, accidental fits of precipitation took place, in ſuch manner as to form a range of ſhort cylinders, whoſe upper ends ſhould chiefly be convex: That as theſe joints became ſomewhat ſolid, a ſecond fit of precipitation took place, forming a ſe-

* Ille cenſet, in infinito inani, in quo nihil nec ſummum, nec infimum, nec medium, nec ultimum, nec extremum ſit; ita ferri ut concurſionibus inter ſe cohereſcant: ex quo efficiantur, ea quæ ſint, quæque cernantur omnia.

cond

cond range of incumbent joints, which muſt generally be concave, adapted to the convexity of the lower order, and thus, by ſucceſſive fits of precipitation, he ſuppoſes a ſet of erect cylinders might be generated in contact with each other. Now a ſet of cylinders can touch only in right lines, and therefore muſt leave empty ſpaces between them; but the pillars being yet ſoft, and yielding to the encreaſing preſſure from above, ſhould, he imagines, dilate, and ſpread themſelves out ſo as to fill up the vacuities. And thus he conceives may the polygon, articulated pillars, of the Giants Cauſeway, be generated.

I SHALL not delay you by any commentary on this unhappy theory, only to obſerve, that a more accurate enquiry would have diſcovered horizontal and even curved pillars, for the production of which this cauſe is utterly inadequate*.

SUCH

* Mr. D'Acoſta, who has publiſhed this account of Doctor Pococke's in his Hiſtory of Foſſils, ſtrangely ranks the

SUCH is the hiſtory of the Giants Cauſeway, and ſuch have been the labours of the learned, and their various opinions concerning its ſtructure, in which, whatever may have been already accompliſhed, much certainly remains to be done, towards a judicious arrangement of a ſufficient number of materials, whereon to build any general theory to ſatisfy a reaſonable mind, with reſpect to its formation.

IN my laſt letter I mentioned that the extent of country contiguous to the Cauſeway, through which all the varieties of this ſpecies of ſtone prevailed, was much greater than had been imagined: And within theſe few years, it has been diſcovered abroad, that

the baſaltes among the claſs of marbles, or ſtones allied to marbles, with which it has not any one common feature of reſemblance, except that it will receive a poliſh; ſo that he might with equal propriety have claſſed it with any other hard ſubſtance in nature. In truth he ſeems to be very ill informed on the ſubject, imagining this to be the only ſtone of the kind ever diſcovered, and is in amaze to think how far it may extend into the ſea.

the

the baſaltes is a very common foſſil through every part of the world, there being few kingdoms where it may not be found under one ſhape or another. Hence it has come to paſs that the obſervations of men of ſcience in diſtant places have been united on this ſubject; different theories have been compared together: and more general analogies ſuggeſted, on which to build ſome rational conjectures, concerning the cauſe that might have produced theſe wonderful pillars.

It is ſomewhat ſingular, however, that during theſe enquiries abroad, all appeals which have been made to the Giants Cauſeway, in favour of any particular ſyſtem, have always proved fallacious; and ſtill more extraordinary, when one conſiders that theſe errors ſhould have principally ariſen from the extreme pains employed in deſcribing it, particularly from thoſe two accurate and beautiful drawings executed by Mrs. Drury, which have really been a ſtumbling block to moſt of the foreign writers on this ſubject. Thus

Monſ.

Monſ. Demareſt, the ingenious father of the volcanic theory of baſaltes, ſtrangely imagines that the cauſeway has been a current of lava erupted from the ſide of a conical mountain, though there is not a mountain of any ſort in its vicinity, nor one of that particular ſhape within a great many miles of it.—The truth is, that gentleman ſaw theſe much celebrated drawings, and has miſtaken the ſegment of a ſhelving cape, at whoſe baſe the pillars ſtand, for a portion of a conical hill cut down in the direction of its axis; and this error has been confirmed by the prevailing cuſtom of putting thoſe pictures together in the ſame frame; ſo that the two ſegments, ſtanding back to back, exhibit the appearance of an entire conical mountain, ſuch as Mr. Demareſt deſcribes *.

It

* Je tirai de cette conformité reconnu, un conſequence que la force de l'analogie m'autoriſoit a tirer: cette conſequence me fit voir, dans la Chauſee de Geans, & dans toute le Maſſes priſmatiques que ſe montrent ſur le bord eſcarpes de la Mere en Ireland, en un Mot dans le Sommet tronques, q'on y'appercoit, l'ouvrage des eruptións, d'un

It was alſo obſerved by foreigners, that in every drawing and deſcription of the Giant's Cauſeway, particular attention was paid to the circumſtance of its projecting into the ſea; hence a crude and indefinite opinion was adopted by many writers, that the pillars of baſaltes were produced by the refrigeration of a liquid body of lava, in conſequence of being ſuddenly plunged into water. Such is the theory of a Mr. Raſpe, who has publiſhed an account of the valley of Heſſe Caſſel in Germany; and ſuch are the ſentiments advanced by Monſ. De Luc, in his excellent Letters addreſſed to the Queen of England, in which he gives as his opinion, that the ancient volcanos were formed in the ocean, where the ſudden cooling of the melted maſs (not to count on the preſence of the marine ſalt) might have determined a regularity of figure in the cooling body *.

Though

d'un ou de pluſieur Volcans, qui ſe ſont éteint, comme ceux des Auvergne.—*See Monſ. Demareſt's Memoir on the Baſaltes of Auvergne, in the Volume of the French Academy for* 1771.

* Or, on voit une cauſe de plus, dans les Volcans anciens, que dans les modernes, pour produire cet effet;

THOUGH this opinion does, with much ingenuity, aſſign a reaſon why the baſaltic pillars are not produced at this day, as they were formerly; yet a little conſideration will ſhew that it ought not haſtily to be adopted; ſince general experience teaches us that all tumultuary cauſes are only adapted to introduce tumultuary effects: Every ſpecies of regular figure produced by chryſtallization, or any mode whatever analogous to it, being always more perfect, in proportion as length of time, and reſt, have allowed the different particles to unite gradually; indeed a moment's reflection muſt ſatisfy any one, that the furious encounter of a river of liquid fire with the waters of the ocean, ſo far from being ſuited to form the neat and elegant arrangement of our pillars of baſaltes, can only tend to introduce confuſion and irregularity.—But in truth, any argument derived from the

c'eſt de s'etre formes dans la Mer, ou, ſans compter la preſens du Sel, l'attouchement ſeul de l'cau, en produiſant un condenſation plus ſubite, a pu etre un circonſtance determinante.

De Luc Lettres a la Reine de Grande Bretagne.

particular

particular ſituation of the Giant's Cauſeway will be found extremely erroneous; becauſe the circumſtance of its ſtanding in the ſea, is purely accidental; ſimilar pillars being often diſcoverable on the ſummit of the higheſt grounds in its neighbourhood, many hundred feet above the level of the beach.

I SHALL no longer weary your patience by a more minute account of the opinions to which this celebrated Cauſeway has given birth; but ſhall haſten to a general view of the bold volcanic theories that have been advanced to explain the production of the pillars of baſaltes.

LETTER VIII.

Portruſh, Auguſt 24, 1784.

DEAR SIR,

THE vicinity of the little fiſhing village of Portruſh to the Giant's Cauſeway, has afforded me, during my ſtay here, ample opportunity to viſit that curious work of nature, and to examine, with a good deal of attention, the features of the adjoining country, which has hitherto been very imperfectly known.

THE Cauſeway itſelf is generally deſcribed as a mole or quay, projecting from the baſe of a ſteep promontory, ſome hundred feet into the ſea, and is formed of perpendicular pillars

pillars of baſaltes, which ſtand in contact with each other, exhibiting an appearance not much unlike a ſolid honeycomb. The pillars are irregular priſms, of various denominations, from four to eight ſides *; but the hexagonal columns are as numerous as all the others together.

On a minute inſpection, each pillar is found to be ſeparable into ſeveral joints, whoſe articulation is neat and compact beyond expreſſion; the convex termination of one joint, always meeting a concave ſocket in the next; beſides which, the angles of one frequently ſhoot over thoſe of the other, ſo that they are compleatly locked together, and

* Monſieur Faujas de St. Fond took much pains to ſearch for pillars of nine ſides among the baſaltes of Viverais, in conſequence of the account which Mr. Molleneux and Monſieur de Liſle gave that ſuch were to be found; but there is little doubt that both thoſe gentlemen were miſtaken, as none of that denomination are to be diſcovered at the Giant's Cauſeway or its neighbourhood. Indeed octagonal pillars are very rarely to be met with.

can

can rarely be ſeparated without a fracture of ſome of their parts.

THE ſides of each column are unequal among themſelves, but the contiguous ſides of adjoining columns are always of equal dimenſions, ſo as to touch in all their parts.

THOUGH the angles be of various magnitudes, yet the ſum of the contiguous angles, of adjoining pillars, always makes up four right ones.—Hence there are no void ſpaces among the baſaltes, the ſurface of the cauſeway exhibiting to view a regular and compact pavement of polygon ſtones.

THE outſide covering is ſoft, and of a brown colour, being the earthy parts of the ſtone nearly deprived of its metallic principle by the action of the air, and of the marine acid which it receives from the ſea *.

* This coating contains iron which has loſt its phlogiſton, and is nearly reduced to a ſtate of calx; for with a very moderate heat it becomes of a bright red ochre colour, the attendant of an iron earth.

THESE

THESE are the obvious external characters of this extraordinary pile of baſaltes, obſerved and deſcribed with wonder by every one who has ſeen it. But it is not here that our admiration ſhould ceaſe;—whatever the proceſs was by which nature produced that beautiful and curious arrangement of pillars ſo conſpicuous about the Giant's Cauſeway; the cauſe, far from being limitted to that ſpot alone, appears to have extended through a large tract of country, in every direction, inſomuch that many of the common quarries, for ſeveral miles around, ſeem to be only abortive attempts towards the production of a Giant's Cauſeway.

FROM want of attention to this circumſtance, a vaſt deal of time and labour has been idly ſpent in minute examinations of the Cauſeway itſelf;—in tracing its courſe under the ocean—purſuing its columns into the ground—determining its length and breadth, and the number of its pillars—with numerous wild conjectures concerning its original;

original; all of which ceaſe to be of any importance, when this ſpot is conſidered only as a ſmall corner of an immenſe baſalt quarry, extending widely over all the neighbouring land.

THE leading features of this whole coaſt are the two great promontories of Bengore and Fairhead, which ſtand at the diſtance of eight miles from each other: Both formed on a great and extenſive ſcale, both abrupt toward the ſea, and abundantly expoſed to obſervation, and each in its kind exhibiting noble arrangements of the different ſpecies of columnar baſaltes.

THE former of theſe lies about ſeven miles weſt of Ballycaſtle, and is generally deſcribed by ſeamen, who ſee it at a diſtance and in profile, as an extenſive headland, running out from the coaſt a conſiderable length into the ſea; but, ſtrictly ſpeaking, it is made up of a number of leſſer capes and bays, each with its own proper name, the *tout enſemble* of which

which forms what the ſeamen denominate the headland of Bengore.

THESE capes are compoſed of variety of different ranges of pillars, and a great number of ſtrata; which, from the abruptneſs of the coaſt, are extremely conſpicuous, and form an unrivalled pile of natural architecture, in which all the neat regularity and elegance of art is united to the wild magnificence of nature.

THE moſt perfect of theſe capes is called Pleaſkin, of which I ſhall attempt a deſcription, and along with it hope to ſend a drawing which my draftſman has taken from the beach below at the riſque of his neck; for the approach from theſe promontories down to the ſea is frightful beyond deſcription, and requires not only a ſtrong head, but very conſiderable bodily activity to accompliſh it.

THE ſummit of Pleaſkin is covered with a thin graſſy ſod, under which lies the natural rock,

rock, having generally an uniform hard ſurface, ſomewhat cracked and ſhivered. At the depth of ten or twelve feet from the ſummit, this rock begins to aſſume a columnar tendency, and forms a range of maſſy pillars of baſaltes, which ſtand perpendicular to the horizon, preſenting, in the ſharp face of the promontory, the appearance of a magnificent gallery or colonade, upward of ſixty feet in height.

THIS colonade is ſupported on a ſolid baſe of coarſe, black, irregular rock, near ſixty feet thick, abounding in blebs and air-holes—but though comparatively irregular, it may be evidently obſerved to affect a peculiar figure, tending in many places to run into regular forms, reſembling the ſhooting of ſalts and many other ſubſtances during a haſty cryſtallization.

UNDER this great bed of ſtone ſtands a ſecond range of pillars, between forty and fifty feet in height, leſs groſs, and more ſharply defined than thoſe of the upper ſtory, many

of

of them, on a close view, emulating even the neatness of the columns in the Giant's Causeway. This lower range is borne on a layer of red ochre stone, which serves as a relief to shew it to great advantage *.

These two admirable natural galleries, together with the interjacent mass of irregular rock, form a perpendicular height of one hundred and seventy feet; from the base of which, the promontory, covered over with rock and grass, slopes down to the sea for the space of two hundred feet more, making in all a mass of near four hundred feet in height, which in beauty and variety of its colouring, in elegance and novelty of arrangement, and in the extraordinary magnitude of its objects, cannot readily be ri-

* The only instances of different ranges of basaltes that have hitherto been discovered, occur in the valuable work of Monf. Fanjas de St. Fond on the volcanoes of Viverais, &c. but the arrangement which appears there, even with the neatness that always attends an engraving, is greatly inferior to that of Pleaskin.

valled

valled by any thing of the kind at preſent known *.

THOUGH there are but two complete ranges of pillars which appear in any of the promontories, yet it is not improbable that there may be many more in ſucceſſion, at various depths under ground; and this opinion is confirmed by columnar marks which may be traced in ſeveral rocks that lie in the ſea. The Cauſeway itſelf, which is ſituated at the baſe of one of thoſe promontories, on the level of the beach, is one of thoſe columnar beds that has been accidentally ſtripped and waſhed by length of time and ſtorms.

THE pillars of this whole headland appear naturally to affect a perpendicular ſituation,

* Mr. Pennant is much miſtaken in his opinion that the little iſland of Staffa, whoſe greateſt height is but one hundred and twenty-eight feet, contains any object equal to the bold promontories of Bengore.—Neither are the beſt ſpecimens of pillars at Staffa at all comparable to thoſe of the Giant's Cauſeway in neatneſs of form, or ſingularity of articulation.

and

and in the few places where they lie in an inclined poſture, it ſeems to be the effect of ſome external cauſe, which has deranged them from their original diſpoſition. Indeed where the forms of cryſtallization are imperfect, they may be ſeen to ſhoot in various directions, and ſometimes in irregular curves, but in moſt of theſe inſtances the columnar outline is very rude and unfiniſhed.

It is worth remarking, that the ranges of pillars are more perfect in proportion as they lie deeper under ground; the ſecond range in Pleaſkin is evidently better finiſhed than the upper one, and contains much fewer irregularities in the grain of its ſtone; while the pillars of the Cauſeway, which runs into the ſea itſelf, have ſtill a greater ſharpneſs in their figure, and are more cloſe and uniform in their texture.

Such is the general outline of this great headland, which affords objects extremely intereſting to every one who may wiſh to ſtudy nature in her bold and uncommon works.

At

At the diſtance of eight miles from hence (as I mentioned before) the promontory of Fairhead * raiſes its lofty ſummit more than four hundred feet above the ſea, forming the eaſtern termination of Ballycaſtle bay. It preſents to view a vaſt compact maſs of rude columnar ſtones, the forms of which are extremely groſs, many of them being near one hundred and fifty feet in length, and the texture ſo coarſe †, as to reſemble black ſchorle ſtone, rather than the cloſe fine grain of the Giant's Cauſeway baſaltes. At the baſe of theſe gigantic columns lies a wild waſte of natural ruins, of an enormous ſize, which in the courſe of ſucceſſive ages have been tumbled down from their foundation by ſtorms, or

* This is the Robogdium Promontorium of Ptolemy the geographer.

† Theſe pillars do not at firſt view appear to have any marks of articulation; but on obſerving ſuch as have fallen down from the top of Fairhead, they are found to be often ſeparated into pretty regular joints by the force of the fall.

ſome

ſome more powerful operations of nature. Theſe maſſive bodies have ſometimes withſtood the ſhock of their fall, and often lie in groups and clumps of pillars, reſembling many of the varieties of artificial ruins, and forming a very novel and ſtriking landſcape.

A SAVAGE wildneſs characterizes this great promontory, at the foot of which the ocean rages with uncommon fury. Scarce a ſingle mark of vegetation has yet crept over the hard rock to diverſify its colouring, but one uniform greyneſs clothes the ſcene all around. Upon the whole, it makes a fine contraſt with the beautiful capes of Bengore, where the varied brown ſhades of the pillars, enlivened by the red and green tints of ochre and graſs, caſts a degree of life and chearfulneſs over the different objects.

THOUGH I have particularly deſcribed the baſalt pillars of theſe two magnificent promontories, yet there are many other ſimilar arrangements through this country, which, though leſs worthy of admiration as great

objects,

objects, yet become extremely intereſting when one wiſhes to ſearch minutely into the natual cauſes which might have produced theſe extraordinary pillars.

THE mountain of Dunmull, lying between Coleraine and the river Buſh, abounds in this ſpecies of ſtone, particularly at the craigs of Iſlamore, where two different ranges of columns may be diſcovered; and at moſt of the quarries which have occaſionally been opened round the mountain.—They may be ſeen alſo at Dunluce-hill, near the caſtle of Dunluce:—In the bed of the river Buſh, near the bridge of Buſhmills:—On the ſummit of the mountain of Croaghmore:—In many parts of the high land over Ballintoy:—In the iſland of Raghery; and various other places, through an extent of coaſt about fifteen miles in length, and two in breadth *.

I SHALL

* Beyond this tract, which abounds in perfect pillars, an attentive obſerver will be able to trace the ſame ſpecies of foſſils in very diſtant parts of the country, as far as the

I SHALL not at preſent delay you with a minute deſcription of each of theſe, but may, in the courſe of my Letters, take an opportunity to mention the general character of the face of this country, and any ſingularities worthy notice, in the forms and ſituation of its baſaltes.

Yours, &c.

northern ſhore of Loughneagh, and the mountains of the county of Derry; in many places of which, imperfect columnar forms may be obſerved; ſo that the great cauſe which generated this ſpecies of ſtone, has been exerted through a ſpace of more than forty miles in length, and twenty in breadth; that is, through above eight hundred ſquare miles.

LETTER

LETTER IX.

Portruſh, Auguſt 13, 1784.

DEAR SIR,

IN my laſt letter I deſcribed the external character of the Giant's Cauſeway pillars, which will abundantly ſerve to diſcriminate the columnar baſaltes from any other foſſil of a different ſpecies, at preſent known. But as this ſtone does not always appear in its priſmatical form, it will be convenient to take notice of ſome other properties, not immediately derived from its figure, by which we ſhall be enabled to diſtinguiſh it in thoſe inſtances where it may be diſpoſed in more rude and irregular maſſes.

THE baſaltes of the Giant's Cauſeway * is a black, ponderous, cloſe-grained ſtone; which does not effervesce in any of the mineral acids.

ITS ſpecific gravity is to that of water, nearly in the proportion of 2,90 to 1,00— and to that of the fineſt marble as 2,90 to 2,70.

THOUGH its texture be compact, it is not abſolutely homogeneous; for, if ground to a ſmooth ſurface, its bright jet-black poliſh is disfigured by ſeveral ſmall pores.

IT ſtrikes fire imperfectly with a ſteel.

WHEN expoſed to a moderate heat in a common fire, it aſſumes a reddiſh colour, which is more vivid on its natural outſide co-

* I have intentionally confined this account to the ſtone of the Giant's Cauſeway, becauſe it ſeems as perfect in its kind as any hitherto diſcovered, and may in ſome meaſure ſerve for a ſtandard with which to compare other ſtone of the ſame ſpecies.

vering,

vering, and loſes about $\frac{1}{50}$ part of its weight *.

In a more intenſe heat it readily melts, and is, as the chymiſts expreſs it, fuſible per ſe.

With the aſſiſtance of an alkali flux it may be vitrified, and forms an opake glaſs of a black or blueiſh colour.

Its principal component parts are iron in a metallic ſtate, combined chiefly with ſiliceous and argillaceous earths.

Its metallic principle may be demonſtrated by a very ſimple experiment.—Let a ſmall fragment of baſaltes, in its natural ſtate, be brought into contact, or very near to a good magnetical needle, and it may be made to detain the needle at a conſiderable diſtance from its meridian. Let this fragment be

* This loſs probably ariſes from water expelled by the heat. For in the courſe of twenty-four hours after, it will have nearly recovered its former weight, particularly if it be moiſtened.

touched

touched by a magnet, and it will acquire a pretty ſtrong polarity, capable of attracting or repelling the needle at the diſtance of an inch or more. From hence it is proved to contain iron in a metallic ſtate, becauſe the calx of that metal is incapable of producing any magnetical phænomena whatever.

To determine the quantity and quality of each conſtituent part, requires a very ſlow and laborious operation, which would be almoſt equally tedious in the deſcription. I ſhall therefore juſt mention the reſults from the experiments of that able chymiſt, Sir Torbern Bergman, whoſe authority you will not readily queſtion:

	Baſaltes 100 parts.	
Contains	Silicous earth	50 parts.
	Argillaceous earth	15
	Calcarious earth	8
	Magneſia	2
	Iron	25
		100

FROM theſe elements we ſhall eaſily be enabled to account for ſeveral of its properties.

HENCE it comes to paſs that its ſpecific gravity is ſo conſiderable, exceeding that of many ſtones which, when poliſhed, appear much more compact, the quantity of phlogiſticated iron eaſily making compenſation.

WE ſee alſo why it anſwers ſo well for a touchſtone, the hardneſs of its iron particles eaſily rubbing and fretting off the parts of any ſofter metal which may be applied to it, and its black ground ſerving to diſplay theſe to greater advantage.

HENCE too ariſes its fuſibility without addition; for though flint, clay, and calcarious earth are ſeparately refractory, in any degree of artificial heat, yet when mixed together they are readily fuſible, and ſtill more eaſily when united with phlogiſticated iron.

FROM

FROM the metallic ſtate of its iron element we are enabled to infer, a priori, that the columns of the Giant's Cauſeway are all natural magnets, whoſe lower extremity is their north pole, and the upper extremity their ſouth pole. For having ſtood during many ages in a perpendicular poſition they muſt have acquired that polarity which is peculiar to all iron ſubſtances, in a ſimilar ſituation; and like natural magnets, every fragment, when broken, will have its north and ſouth pole. And this I have found true by experience; each pillar of the Giant's Cauſeway, and each fragment of a pillar, which I applied near to the needle, having its attractive and repellent point.

HENCE likewiſe it follows that the great capes in the neighbourhood of the Cauſeway, muſt poſſeſs a ſimilar property; and accordingly, in the ſemicircular bays of Bengorehead, I have often found the compaſs very much deranged from its meridian.

THE

THE magnetiſm of theſe capes may perhaps be an object of ſome curioſity; it might be well worth enquiring how far ſuch maſſes of phlogiſticated iron, within the earth, may produce thoſe ſudden and unaccountable deflexions of the needle, which are always inconvenient, ſometimes ſo dangerous to ſeamen: And whether that ſtill more myſterious and inexplicable phænomenon of the annual variation, may not ariſe from the gain or loſs of the principle of metalliety, which in the ſlow and regular courſe of nature may poſſibly take place, by the various action of heat and moiſture.

WE have proof ſufficient, on a diminutive ſcale, that iron may by variety of artificial means, loſe or gain that principle on which alone its magnetical property depends; and the decompoſition of the baſaltes enables us to affirm, with reaſonable certainty, that ſuch changes do actually take place in nature, and that the magnetical phænomena of the promontory of Bengore for inſtance, muſt now be different from what it was ſome ages ago,

or

or from what it will be ſome ages hence: It may, therefore, deſerve conſideration, how far this analogy could be purſued with reſpect to the whole maſs of the earth; particularly as we have evidence of the exiſtence of a natural agent abundantly adequate to this effect, I mean ſubterranean fire, whoſe extenſive dominion is indiſputably proved by thoſe numerous volcanos that have been diſcovered in ſo many diſtant parts of the world, and whoſe ſources muſt lie at very conſiderable depths below the ſurface of the earth, if we may argue from the vaſt quantity of different ſubſtances which they have vomited forth in their various eruptions.

FROM a knowledge of theſe elementary parts of the baſaltes, we are furniſhed with an analogy tending to throw ſome light on the regularity of its form. One of its principles is found to be ſilicious earth, and we have very numerous proofs that this ſubſtance does, in other inſtances which come within our obſervation, frequently affect a regular figure; variable however under various circumſtances.

Thus,

Thus, rock cryſtal, which is a very pure flinty earth, is commonly diſpoſed in the form of hexagonal priſms, the denomination of ſides which chiefly prevails among our baſaltic pillars—Thus, variety of cryſtallizations are found to take place in the metal of glaſs-houſes, where the furnace has been ſuffered to cool gradually.

IRON is another of the principles which enter into the beſaltes; and this metal is found to cryſtallize in regular figures, when all fit circumſtances concur to permit the due arrangement of its parts. This is ſometimes diſcoverable in the ores of that metal, and may be obſerved to take place imperfectly even in our founderies, in what is commonly called the grain of caſt iron, generally preſenting to view a ſtriated appearance: But in caſes where the pains and ingenuity of the chymiſt has been exerted to exhibit this phænomenon more deciſively, very regular cubical figures have been produced, clearly aſcertaining the exiſtence of this tendency toward a peculiar diſpoſition of its parts.

In truth, the particles of every ſubſtance in nature, appear to poſſeſs private laws and affinities, whereby they proceed to unite, and to arrange themſelves in regular forms, when all things neceſſary combine to aſſiſt this tendency; that is, when by any means whatever, the particles are removed to a ſufficient diſtance, and afterward ſuffered to approach ſlowly and regularly according to their various laws of action.

Thus it appears to be in the caſe of ſaline ſubſtances, which have been held in ſolution in a watery medium; for if by the uniform evaporation of the fluid, or any other ſlow and regular cauſe whatever, time and ſpace be allowed in which the diſſolved particles may exert, without diſturbance, their private laws of affinity, theſe particles will be found to affect an arrangement peculiar to that ſpecies of body to which they belong. Thus again, all bodies which have been diſſolved by the medium of heat, when ſuffered to cool equably, and without the rapid afflux of freſh portions of air, do univerſally exhibit a peculiar

peculiar diſpoſition of parts; of which inſtances enough occur in every ſpecies of metal, in ſulphurs, in glaſs, and in ſhort in all ſubſtances capable of a perfect fuſion.

SINCE therefore we have ſufficient evidence, in ſuch inſtances as come within the reach of human powers and obſervation, that the elementary parts of the baſaltes do affect a ſpecific form of cryſtallization, and that this form is always more and more perfect, in proportion as our experiments are made with greater regularity, and on a larger ſcale; it may not appear unreaſonable to purſue the ſame analogy in the extenſive operations of nature, where thoſe laws, which are but imperfectly exerted in our diminutive experiments, may act with full and undiſturbed vigour, capable of producing the beautiful ſymmetry and arrangement of a Giant's Cauſeway. And though cryſtals have probably never been produced from any ſimple ſubſtance, preciſely anſwering to the articulated baſalt pillars; yet no very important objection can be derived from hence, ſince it is well known

known that elements which ſeparately form ſpecific cryſtals, may when united, conſtitute by their compound laws, bodies different from either figure. Thus melted glaſs through which ſcoriæ of iron had been accidentally mixed was found to affect a columnar ſhape *.

THESE are the chief matters worthy notice, which have come under my own immediate obſervation with reſpect to the perfect ſtone of the Giant's Cauſeway. I ſhall next mention ſome of the leading varieties of its different ſpecies.

FIRST. With reſpect to form and magnitude.—The pillars of the Cauſeway are ſmall, not very much exceeding one foot in breadth, and thirty in length; ſharply defined, neat in their articulation, with convex or concave terminations to each joint. In many of the capes and hills they are of a larger ſize, more

* Vide Ker's Obſervations on the Cryſtallization of Glaſs.—*Phil. Tranſ. vol.* 65.

imperfect

imperfect and irregular in their figure and articulation, having often flat terminations to their joints. At Fairhead they are of a gigantic magnitude, ſometimes exceeding five feet in breadth, and a hundred in length; oftentimes apparently deſtitute of joints altogether. Through many parts of the country this ſpecies of ſtone is entirely rude and unformed, ſeparating in looſe blocks, in which ſtate it reſembles the ſtone known in Sweden by the name of Trappe.

SECONDLY. With reſpect to ſituation.—The pillars at the Giant's Cauſeway ſtand on the level of the beach; from whence they may be traced through all degrees of elevation, to the ſummit of the higheſt grounds in the neighbourhood; as at the old fort of Dunmull; and on the top of Croaghmore, ſix hundred feet at leaſt above the level of the ſea.

THIRDLY. With reſpect to diſpoſition and arrangement.—At the Cauſeway, and in moſt other places, they ſtand perpendicular to the horizon;

horizon; in ſome of the capes, and particularly near Uſhet harbour in the Iſle of Raghery, they lie in an oblique poſition; at Doon point, in the ſame iſland, and along the Ballintoy ſhore, they form variety of regular curves.

THE little point of Doon is indeed extremely curious, containing at once perpendicular, horizontal and bending pillars. Its baſe reſembles a mole compoſed of erect columns like thoſe of the Giant's Cauſeway; over the extremity of this maſs others appear in a bending form, as if they had ſlid over in a ſtate of ſoftneſs, capable of accommodating themſelves to the courſe of their deſcent, and thus aſſuming the figure of various curves in conſequence of the action of gravity; over all, ſeveral pillars are diſpoſed in an horizontal poſition, ſuch as would accord with an hypotheſis of their having juſt reached the brink of the deſcent where they were ſuddenly arreſted, and became rigid, lying along with their extremities pointing out toward the ſea.

FOURTHLY.

FOURTHLY. With reſpect to colour and grain.—The Giant's Cauſeway ſtone is black, cloſe, and uniform; its varieties of colour are blue, reddiſh, grey; and of grain, all that can be ſuppoſed from extreme fineneſs, to the coarſe granulated appearance of a ſtone which reſembles imperfect granite, abounding in cryſtals of ſchorl, chiefly black, though ſometimes of various colours.

FIFTHLY. With reſpect to texture.—We muſt obſerve, that though the Giant's Cauſeway ſtone be in general compact and homogeneous, yet it is remarkable that the upper joint of each pillar, where it can with certainty be aſcertained, is always rudely formed and cellular *: The groſs pillars alſo, in the capes and mountains, frequently abound in theſe air-holes through all their parts, which ſometimes contain fine clay, and other apparently foreign bodies: And the irregular baſaltes, beginning where the pillars ceaſe, or lying over them, is in general extremely honey-combed, containing in its cells cryſtals

* Vide pillars at the Muſeum of Trin. Coll. Dub.

of zeolyte, little morſels of fine brown clay, ſometimes very pure ſteatite, and in a few inſtances bits of agate.

THE foſſils attendant on the baſaltes, are Firſt—Extenſive layers of red ochre, varying in all degrees from a dull ferruginous colour, to a bright red, anſwering well for coarſe paint.

SECONDLY—Veins of iron ore, ſometimes very rich, commonly of a brown or reddiſh caſt, at other times of a changeable blue colour.

THIRDLY—Steatites, generally of a greeniſh ſoapy appearance, more rarely of a pure white —it raiſes an imperfect ſaponaceous froth when agitated with water.

FOURTHLY—Zeolyte, of a bright and pureſt white colour; in maſſes varying in weight from a grain to a pound; generally diſpoſed in cavities of the cellular baſaltes; often affecting a cryſtallization, in which the fibres radiate out from one center, in ſome inſtances reſembling a beautiful ſpangled appearance of

thiſtle-

thiſtle-down. The moſt remarkable property of this foſſil is, that it forms a gelatinous mixture in the courſe of a few hours with any of the mineral acids, moſt readily with ſpirit of nitre *.

FIFTHLY—Peperino ſtone, a friable matrix of indurated clay and iron, ſtudded with little morſels of zeolyte, and other ſubſtances. It is often of reddiſh burnt colour, correſponding accurately with the peperino ſtone of Iceland.

* Zeolyte is ſaid by the chymiſts to be compoſed of argillaceous, ſiliceous and calcarious earths, united in certain proportions to water (vide Kirwan's Mineralogy, page 65). Now that theſe elements may poſſibly be found in it I do not deny, but that its ſingular properties can be accounted for from this union alone ſeems not likely. In truth, chymical teſts depending only on affinities already known, cannot always diſcover the preſence of that element on which the chief phænomena of bodies may often depend. A chymical analyſis can then only be eſteemed perfectly deciſive when it is ſupported by a fair ſynthetical proof, demonſtrating that the component parts diſcovered by the analyſis may be ſo united as to form a ſubſtance poſſeſſed of all the properties of the original.

SIXTHLY—Pumice-ſtone, of a deep black colour, containing iron not entirely dephlogiſticated, but ſtill capable of acting on the needle; ſometimes found on the ſhore of the iſland of Raghery.

THE following foſſils ſeem to have exiſted in their preſent form, independent of, and perhaps antecedent to, the baſaltes.

FIRST. Chalky limeſtone.—The whole country appears to have been originally formed of this ſubſtance, to the height of ſeveral hundred feet above the preſent level of the ſea. It lies in beds nearly parallel to the horizon, and contains ſome ſcarce petrefactions, particularly belemnites—more rarely aſteriæ.

SECONDLY. Flints.—Theſe are diſpoſed in great abundance, and of various ſhapes, through the chalky limeſtone; ſometimes, however, they are found looſe through the ground: at other times they may be diſcovered among the baſaltes*: but in all

* For inſtance, under Dunluce Caſtle.

theſe

theſe inſtances the limeſtone appears to be their proper matrix, from whence they have been only accidentally diſperſed; for the vegetable mold (in which they are never found, except near the limeſtone) moſt commonly abounds in calcarious earth, as if it had been principally formed by the decompoſition of that ſubſtance, while the harder texture of the flints, ſuffering little change, were ſcattered in their original ſtate irregularly through it. As for the baſaltes, it only contains them at, or very near to the place of contact with the inferior maſs of calcarious ſtone, bits of which ſtill continue to adhere to the flints in many parts. The ſubſtance of the flints too ſeems to have undergone ſome change in this ſituation, their tranſparency, hardneſs and colour being often conſiderably altered.

THIRDLY. Sandſtone.—A great maſs of this forms the eaſtern ſide of Ballycaſtle bay, and in one part the baſalt pillars of Fairhead reſt on it.

FOURTHTY. Pit coal.—It lies in beds between the layers of ſandſtone at Ballycaſtle,

and

and appears to continue under the ſea to the iſland of Raghery.

FIFTHLY. Martial vitriol.—This is formed among the coal pits, by the union of the ſulphureous acid of the coals with a ſtratum of iron.

SIXTHLY. A very ſingular range of calcarious phoſphoric rocks.—Theſe lie on the ſhore of the iſle of Raghery, nearly where the vein of Ballycaſtle coals might be ſuppoſed to reach. Cloſe to the ſhore it reſembles a hard white limeſtone, of a blueiſh caſt; a little further inland it becomes ſofter, and whiter; by and by it aſſumes the appearance of a calcarious ſand ſtone; in each of which ſtates it produces a vivid yellowiſh light when ſprinkled on coals, or a hot iron. It does not emit a ſulphureous ſmell in burning, nor does it diſcolour vitriolic acid in ſolution *.

* Specimens of all theſe foſſils may be ſeen in the Muſeum of T. C. D. under the deſcription of Iriſh Foſſils, County of Antrim.

I HAVE here given you a ſummary of the principal varieties of the baſaltes, and its attendant foſſils; perhaps you will ſay that my brevity does not help to make me intelligible, but to this I muſt anſwer, firſt, that if foſſils cannot be aſcertained by a few general characteriſtics, a more laboured deſcription of minute circumſtances will do little elſe than perplex any perſon who is not a very good mineralogiſt, in which caſe we have no reſource but in actual obſervation. And, ſecondly, that ſuch circumſtances as I have here mentioned, will probably afford a foundation broad enough on which to build any analogical reaſoning that may be derived immediately from the nature of the ſubſtances themſelves.

As I ſhould be ſorry to have given you the trouble of reading this letter, only for the unprofitable labour of learning uncommon names, which would certainly be the caſe did this account terminate the ſubject; I ſhall, in my next letter, candidly apply ſuch arguments as can be derived from the nature and properties of theſe foſſils, to explain the

volcanic

volcanic theory of the production of the baſaltes; at the ſame time, however, I hope to be able to ſtate, with equal honeſty, ſuch objections as ſeem moſt ſubſtantially to militate againſt this favourite hypotheſis—leaving it to your own excellent judgment to decide on a ſubject, where, as Sir Roger de Coverly would obſerve, "much might be ſaid on "both ſides."

LETTER

LETTER X.

Portruſh, Auguſt 31, 1784.

DEAR SIR,

THERE are few things that can affect a contemplative mind with more ſurpriſe, than the numerous and ſignal changes which appear to have taken place, in the form and arrangement of our earth, at ſome very diſtant age. It is a ſubject which has at all times engaged the attention of mankind, and certainly conſtitutes the moſt intereſting department of natural hiſtory.

FROM the frequent and unequivocal veſtiges of marine productions, which are found in

in the midſt of our moſt extenſive continents, and on the ſummit of ſeveral of the loftieſt mountains, ſome philoſophers have been induced to attribute the formation of the preſent habitable world, to the violent and tumultuary fury of the ocean, agitated by ſome uncommon cauſe*: Whilſt others† have thought, that the gradual, but unceaſing efforts of its heaving billows, were abundantly adequate to account for theſe appearances on more common principles.

But variety of natural phænomena occur to an attentive obſerver, which are deemed incapable of being reaſonably explained by theſe hypotheſes; whether we regard the general features and elevation of many of our continents, or the nature and ſituation of the foſſils which they contain.

Hence it has come to paſs, that a new and more powerful principle, eſteemed entirely

* Burnet, Whiſton, Woodward, &c.

† Buffon, &c.

equal

equal to thoſe effects, has been adopted, and many of the moſt ſurpriſing phænomena of nature are held to be explicable by the potent agency of ſubterranean fire.

To this latter cauſe the formation of our pillars of baſaltes has been attributed, with ſome appearance of probability; and though much has been ſaid on this ſubject with vagueneſs and indeciſion, concerning the manner of their production, yet the principal facts that have been adduced in favour of the general opinion, are well worthy of attention, and open to view a very novel and important object of enquiry.

THE firſt perſon who took a decided part in favour of the volcanic theory of the baſaltes, was Monſieur Deſmareſt, a French gentleman, whoſe Memoire on that ſubject may be ſeen in the publication of the Royal Academy of Sciences for the year 1771. Mr. Deſmareſt made a tour through the county of Auvergne, one of the ſouthern provinces of France in the neighbourhood of the Rhone,

where

where he diſcovered many piles of baſaltes, with more variations of magnitude, figure, and arrangement, than was at that time known about the Giant's Cauſeway in Ireland. By his means a geographical ſurvey was made of this part of France, and a map delineated, in which the direction of the mountains, and the ſituation of its baſaltes, were ſuppoſed to be accurately projected.

From this map, and his own perſonal obſervations of the nature of the ſoil, and the general ſpecies of its foſſils, he conceived that this country had once been ravaged by ſubterranean fire, of whoſe waſteful dominion undeniable veſtiges ſtill remained; and that the bold inequalities of its ſurface, its hills and vallies, were formed by vaſt heaps of ſcoriæ, and different melted ſubſtances, which had iſſued from its volcanic mountains, ſpreading themſelves in every direction from theſe flaming centers.

He imagined alſo, that many of theſe melted torrents might be traced through their

their whole extent, from the ſide of the great volcano which gave them birth in the mountains of D'or, to their remoteſt extremities, where they terminated in banks of priſmatical baſaltes. From all theſe circumſtances he concluded, that the baſaltic columns were formed by the gradual refrigeration of a maſs of fluid lava, during its ſlow and retarded progreſs over the ſubjacent ſoil, and that moſt of its varieties of ſhape and ſituation, might naturally be attributed to the different interruptions of its courſe, or to the alterations introduced by the ſucceſſive ravages of volcanic fire *.

AFTER

* A meſure qu'on parcourt ces Cantons, en faiſant la recherche & l'enumeration des maſſes priſmatiques, qu'on etudie les courants, ſur tout vers leur extremites, qu'on ſuit leur marche depuis le centre des eruptions, leur echainement & leur diſtribution a la ſuperficie des plaines hautes qui ſeparent les vallons, qu'on examine les differentes eſpeces des pierres dont ils ſont compoſes, on reconnoit a chaque pas que ce ſont des hors d' œuvres etablis ſur le ſol naturel. On diſtingues les produits du feu des ſubſtances intactes, & l'on apprecie en meme temps les tranſ-

ports

After Mr. Deſmareſt many writers both foreign and domeſtic purſued this intereſting ſubject with great ardor. Among the Engliſh authors we are principally indebted to the labours of Sir William Hamilton, whoſe valuable collection of facts relating to thoſe places which are at this day the ſeat of living volcanos, afford the ſureſt rules of judgment concerning ſuch countries as do yet bear ſtrong marks of a volcanized appearance, without any direct evidence of the exiſtence of ſubterranean fire.

But the perſon to whom we owe the moſt ample compilation of materials, immediately relating to the baſaltes, is Monſieur Faujas de St. Fond, who has lately publiſhed a voluminous work on the extinct volcanos of Viverais and Velay, counties adjoining to Auvergne, which had before been deſcribed by Mr. Deſmareſt. In this work

ports immenſes des matieres fondues, dont les priſmes ſont toujour partie.—*Deſmareſt ſur l'origine & la nature du Baſalt, ſee Memoires of the French Academy for the Year* 1771.

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the author has given a particular memoire on the baſaltes, to which he has annexed deſcriptions, and engravings of the moſt remarkable banks and mountains of baſaltic columns in theſe two countries. But what renders his work ſtill more valuable, are the minute and accurate accounts which it contains of the attendant foſſils, particularly the zeolyte, ſchorl, and puzzolane earth; becauſe we are from thence enabled to decide whether theſe ſubſtances be univerſally connected with the baſaltes, or are only the accidental attendants of it in a few particular countries; and where ſuch foſſils are found together, we have it in our power to eſtimate fairly the force of thoſe arguments derived from their nature and connexion in any one country, by conſidering candidly, how far they ſhould weigh with us in thoſe inſtances which come immediately under our own particular obſervation.

In my laſt letter I enumerated the chief varieties of the baſaltes and its attendant foſſils, as they occur in the northern parts of Ireland;

Ireland; and I ſhall now briefly ſtate to you ſuch arguments as may be derived from them, in proof of the ancient exiſtence of ſubterranean fire in their neighbourhood.

FIRST. The baſaltes itſelf is eſteemed to be nothing elſe than lava; and its varieties are attributed entirely to accidental circumſtances attending its courſe, or the manner of its cooling.—In ſupport of which opinion it is affirmed that the baſaltes agrees almoſt accurately with lava in its elementary principles *, in its grain, in

* This will appear pretty evident from ſtating the products of each ſubſtance according to the analyſis of that able chymiſt, Sir Torbern Bergman:

Baſaltes, 100 parts.	*Parts.*	Lava, 100 parts.	*Parts.*
Contains Siliceous earth	50	Contains Siliceous earth	49
Argillaceous earth	15	Argillaceous earth	35
Calcarious earth	8	Calcarious earth	4
Magneſia	2	Iron	12
Iron	25		
	100		100

the

the ſpecies of the foreign bodies which it includes *, and in all the diverſities of its texture †.

SECONDLY. The iron of the baſaltes is found to be in a metallic ſtate, capable of acting on the magnetical needle. The ſame is true of the iron contained in the compact lava.

THIRDLY. The baſaltes poſſeſſes the remarkable property of being fuſible per ſe; this property is alſo common to the lava and moſt volcanic ſubſtances.

FOUTHLY. The baſaltes is a foreign ſubſtance, ſuperinduced on the original limeſtone ſoil of the country, in a ſtate of ſoftneſs ca-

* Bits of limeſtone, flints, ſchorl, cryſtals of various colours, morſels of pure clay, &c. are common to the baſaltes and to lava.

† All the varieties of texture which take place in lava, from the compact cloſe-grained kind to the ſpongy lava, may alſo be traced among the baſaltes.

pable of allowing the flints to penetrate conſiderably within its lower ſurface.—It is hardly neceſſary to add, that the lava is an extraneous maſs, overſpreading the adjoining ſoil in a fluid ſtate; that it is often borne on a limeſtone baſe; or that flints and other hard matters do frequently penetrate into its ſubſtance. In ſhort, the circumſtances of agreement are ſo numerous, and ſo clear, as to create a very reaſonable preſumption that they are one and the ſame ſpecies of ſubſtance.

But the evidence derived from the nature and properties of the attendant foſſils, ſeems alſo to contribute largely in ſupport of this opinion.

Thoſe extenſive beds of red ochre, which abound among our baſaltes, are ſuppoſed to be an iron earth reduced to this ſtate of a calx by the powerful action of heat; for ſuch a change may be produced on iron in our common furnaces, provided there be a ſufficient afflux of freſh air; and the baſaltes itſelf

itſelf in ſuch circumſtances is eaſily reduceable to an impure ochre, exactly ſimilar to that found at Bengore. This phænomenon is alſo obſerved to take place more or leſs in the preſent living volcanos, particularly within their craters, and is therefore held to afford a preſumptive argument of the action of fire in the neighbourhood of the baſaltes.

I REMARKED to you the frequent bits of zeolyte which abound in the county of Antrim, and theſe, though not the immediate product (as far I know) of any living volcano, are yet thought to countenance the general ſyſtem, becauſe zeolyte is found in countries where ſubterranean fire is ſtill viſible, and where there is great reaſon to apprehend that the whole ſoil has been ravaged by that principle. Thus it abounds in Iceland, where the flames of Hecla yet continue to blaze *; and in the Iſle of Bourbon, which is ſaid to bear undeniable marks

* Vide Van Troil's Letters on Iceland.

of a volcanic character*; this ſubſtance is therefore ſuppoſed to ariſe from the decompoſition of the volcanic products, in places whoſe fires have been long ſince extinct.

CRYSTALS of ſchorl appear in great plenty among many kinds of our baſaltes, and theſe, though not abſolutely limited to volcanic countries, yet being found in great abundance among the Italian† lavas, in circumſtances exactly correſponding to our's, are thought to ſupply a good probable argument in the preſent inſtance.

THE ſubſtance which I mentioned under the name of the peperino ſtone, is believed to be the undoubted offspring of fire; it has frequently the burnt appearance, and ſpongy texture of many of the volcanic products, and agrees accurately with the peperino of Iceland and Bourbon, iſlands which ſtill contain burning mountains.

* Vide Meſſrs. Deſmareſt, Faujas de St. Fond, Raſpe, &c.

† Vide Ferber's Letters on Italy.

PUZZOLANE earth is not immediately found in that ſtate in Ireland, but it is diſcovered among the baſaltes of France, and there is very little doubt that our baſaltes, if pulverized, would agree with it in every reſpect; that is, it would produce a fine, ſharp powder, containing the ſame elementary parts, and moſt probably anſwering all its valuable uſes as a cement *. Puzzolane earth is found in the Canary Iſlands, which are eſteemed to have other characteriſtics of the effects of fire; it is met in abundance through all the volcanized parts of Italy; it is never diſcovered except in places which have other ſtrong marks of the ravages of fire.

THE diſcovery of this earth is therefore thought to add great weight to the many

* A few experiments on this ſubject might perhaps be worth the attention of the gentlemen concerned in carrying on the inland navigation of Ireland; and there is the more reaſon for hope of ſucceſs in this enquiry, as the Swedes have already applied their pulverized Trappe (much reſembling our coarſe baſaltes) as a good ſubſtitute for the puzzolane formerly brought at great expence from Italy and the Canary Iſlands.

other

other proofs which have been mentioned in favour of the general ſyſtem.

PUMICE-STONE is a ſubſtance ſo generally acknowledged to be the product of fire, that I need not be at any trouble to enforce it; indeed it bears the character of a cinder ſo obviouſly in its exterior appearance, that one muſt be convinced at firſt view of its original. —This foſſil is ſometimes found on the ſhore of the iſland of Raghery, among the rounded ſtones on the beach of the ſea*, and being ſuppoſed an unequivocal teſt of the action of fire, is imagined to compleat all that could be deſired in this kind of reaſoning.

SUCH are the internal arguments in ſupport of the volcanic origin of the baſaltes,

* Pumice-ſtone occurs ſo rarely that I have been often induced to doubt whether it might not be a foreign ſubſtance accidentally driven here by the waves from Iceland, or ſome other volcanic country. However, on trial, it is found too heavy to have floated hither, its iron not being entirely dephlogiſticated, as is evident from its deep black colour, and a ſmall degree of magnetiſm which it ſtill poſſeſſes.

immediately

immediately derived from the nature and properties of that ſubſtance and its attendant foſſils, compared with other ſubſtances which are the certain products of fire; and it muſt be confeſſed there appears throughout ſuch a remarkable coincidence of circumſtances, as raiſes a ſtrong preſumption in favour of the opinion that they have been produced by ſimilar cauſes; but there ſtill remains other external proofs, which, when added to the former, are ſuppoſed to form a demonſtration almoſt as perfect as the nature of ſuch analogical reaſoning will allow.

In the beginning of this letter I mentioned that Meſſrs. Deſmareſt and Faujas de St. Fond had deſcribed the baſaltic provinces of France, as containing mountains, whoſe exterior appearance was ſuch, that they readily pronounced them to be extinct volcanos. One of theſe, on the banks of the river Ardeſche, called the Montagne de la Coupe, ſeems to exhibit the proofs of its origin in characters peculiarly clear and diſtinct. It is

of

of a conical form, exactly correſponding in ſhape with the preſent living volcanic mountains, and like them it contains a large crater nine hundred and fifty feet in diameter, and ſix hundred feet in depth *. The ſubſtances that have been diſcovered through all its parts, particularly in a deep ravine formed on one ſide by torrents, bear a ſtrong reſemblance to many of the Veſuvian products. In fine, the volcanic features of this mountain are ſo ſtrongly marked, that an accurate account of it would afford no very unſuitable deſcription of Veſuvius itſelf during the intervals of its eruptions. Now the Montagne de la Coupe contains at its baſe abundance of baſaltic pillars, which have been expoſed to view on one ſide by the impetuous torrents of this mountainous country, particularly of the river Ardeſche, whoſe banks are formed of columnar baſaltes. And thus are the two characters of a baſaltic and vol-

* Vide Monſ. Faujas de St. Fond—Sur les eteint Volcans, &c.

canic

canic mountain eſteemed to be deciſively united in the Montagne de la Coupe *.

THERE are three living volcanos at preſent known, within whoſe neighbourhood the baſaltes, and moſt ſpecies of its uſual attendant, foſſils, have been obſerved. The firſt is ſituated in the iſland of Bourbon, off the ſouthern coaſt of Africa †; the ſecond is Ætna ‡, in the iſland of Sicily; and the third is Hecla, in the iſland of Iceland ||. To which it may be added, that the baſaltes is found in the volcanized parts of Italy, as at

* I have been the more particular in mentioning this mountain, becauſe my information concerning it has been confirmed by the account of my intelligent friend, Doctor Perceval of Dublin, whoſe accurate obſervations and excellent judgment can only be exceeded by the uncommon candour of his mind.

† Vide Meſſrs. Deſmareſt, Faujas de St. Fond, Raſpe, &c.

‡ The iſland of Caſtel-a-mere, near Catana, off the coaſt of Sicily, is entirely baſaltic.—*Vide Sir William Hamilton's Campi Phlegræi.*

|| Vide Von Troil's Letters on Iceland.

Bolzena,

Bolzena *, and other places ; though not (as far as I have been informed) any where immediately contiguous to Veſuvius. Thus, (ſay the naturaliſts) do the arguments derived from the ſituation of this ſpecies of foſſil, with reſpect to mountains which yet continue to burn, coincide with thoſe other clear and ſatisfactory proofs, which were drawn immediately from its nature and properties, in proof of its volcanic origin.

In addition to what has been here ſtated, I ſhall mention another plauſible argument in ſupport of the opinion, deduced in ſome meaſure a priori.

It is well aſcertained by experience, that there are vaſt beds of pyrites diſperſed through the interior parts of the earth at all depths ; and it is a certain fact, that this compound ſubſtance may, by the accidental affuſion of a due quantity of water, become hot, and at length burn with great fury. This, there-

* Vide Sir William Hamilton's Campi Phlegræi, Ferber's Letters, &c.

fore,

fore, is one principle to which we may, with the ſtrongeſt probability, attribute the origin of ſubterranean fire, more eſpecially as the preſent living volcanos do actually pour forth in abundance all the component parts of the pyrites, the chief of which are ſulphur, iron, and clay. Now, among the ſuperinduced ſubſtances of the county of Antrim (and I believe the ſame may be ſaid of every other baſaltic country) it is certain that the quantity of iron and clay, diffuſed through almoſt every ſpecies of foſſil, amounts to more than one half of the whole materials, ſo that two of the principal elements of the pyrites are ſtill found here, reduced in many inſtances to a ſtate of ſlag or ſcoria; and the third principle, namely the ſulphur, cannot in the nature of things be expected to remain, becauſe ſulphur does in great meaſure periſh during the act of inflammation; and what might perchance eſcape or be ſublimed would no doubt have long ſince periſhed by decompoſition, in conſequence of being expoſed to the air.

THUS

THUS in fact every part of the pyrites which could reaſonably be expected to ſurvive, does at this day actually exiſt, in form extremely ſimilar to the products of Ætna, Veſuvius, and Hecla, the three moſt celebrated volcanos of Europe.

LETTER XI.

Portruſh, September 3, 1784.

DEAR SIR,

NOTWITHSTANDING the numerous, and ſpecious arguments, which are urged in defence of the volcanic theory of the baſaltes, yet many difficulties and objections have been raiſed againſt it by men of excellent underſtanding; ſome of theſe are of conſiderable force, and as I do not wiſh to dictate any opinion to you, but rather, modeſtly to offer what information has come in my way on the ſubject, I ſhall candidly ſtate thoſe objections, together with the moſt reaſonable anſwers.

It is ſaid, that this theory does raſhly attribute ſome of the moſt regular and beautiful phænomena of nature to one of the moſt tumultuary and irregular cauſes that can be imagined; aſcribing the exquiſite arrangement of a Giant's Cauſeway, which almoſt emulates the laboured works of deſign, to the blind fury of a burning volcano.

This objection, which is pretty ſtrong in itſelf, has certainly received very conſiderable ſupport from the various unſucceſsful attempts that have been made to explain the manner in which the pillars of baſaltes were produced: One perſon * wildly attributing their formation to the refrigeration of a current of lava, ſuddenly plunged into the ocean: Another obſcurely hinting that ſome occult quality in the ſea ſalt might have had its ſhare in the buſineſs: A third ‡ ſuppoſing, contrary to experience, that the melted maſs of lava might in its liquid ſtate have been capa-

* Mr. Raſpe.

‡ Mr. Kirwan.

ble

ble of a conſiderable diffuſion or ſolution in water, by which means the particles had an opportunity of arranging themſelves in regular cryſtallizations: A fourth *, conceiving that the baſaltes was originally a bed of iron, and other ſubſtances, gradually moiſtened, and ſoftened in the ſteams of water heated by ſubterranean fire, and afterward aſſuming its regular figure during the time of drying and hardening.

It is pretty plain, that none of theſe indefinite explanations can at all ſatisfy a thinking mind, and as an unfortunate argument generally tends to encreaſe the apparent weakneſs of a cauſe, in defence of which it is brought forward, it has hence come to paſs, that many perſons, of good ſenſe, have held the whole volcanic ſyſtem to be extremely fallacious.

In truth, there ſeems to be but one operation of nature, which affords any rational principle of analogy, by which we can attempt

* Bergman.

tempt to explain the formation of the baſaltic pillars. It is certain that the particles of moſt bodies, when removed from each other to a proper diſtance, and ſuffered to approach gradually, aſſume a peculiar form of arrangement, as if the parts of each ſpecies of matter did, independent of their general properties of coheſion and gravity, poſſeſs alſo private laws and affinities tending to produce theſe ſpecific forms. However, let the cauſe be what it may, the fact at leaſt is ſufficiently certain: and it does not appear to be a matter of any importance by what medium the particles are diſunited, provided only, that a ſufficient ſeparation, and a gradual approximation, be allowed to take place.

THUS, whether bodies be diſſolved by fire, or by a watery medium, the phænomena of cryſtallization is equally obſervable, when proper art has been applied to render its effects viſible.

I MENTIONED, in a former letter, that the baſaltes was capable of a very perfect fuſion,

and

and that two of its elementary parts were ſuch, as, by experience, we know to poſſeſs the property of cryſtallization by fuſion, both in their ſeparate and combined ſtates. Since therefore the baſaltes, and its attendant foſſils, bear ſtrong marks of the effects of fire, it does not ſeem unlikely that its pillars may have been formed by a proceſs exactly analogous to what is commonly denominated cryſtallization by fuſion.

THE only apparent ſpecific difference between the baſaltic cryſtals, and thoſe which are produced in our diminutive elaboratories, ſeems to be, in the complete diſunion of the pillars, and in the articulated form which they ſometimes exhibit. But this will not appear to be a matter of any importance, when we reflect, that in natural operations of the ſame kind, but differing in magnitude, the ſame proportions are commonly obſerved between the different parts: Thus, the ſame ratio which the diameter of a baſaltic pillar bears to the diameter of one of our diminutive cryſtallizations, will the interval be-

tween the pillars of baſaltes bear, to the interval between the parts of our cryſtals; and whoever will take the trouble to calculate this diſtance, will find it ſo very ſmall, as eaſily to admit the different ſurfaces within the limits of coheſion; ſo that no ſeparability of our cryſtals into joints can poſſibly take place, from their ſmallneſs, though they often bear marks which might lead one to imagine them capable of diſunion.

If this reaſoning be allowed to have weight, the objection derived from the irregularity and confuſion of a volcanic cauſe will not appear unanſwerable. For though, during the moments of an eruption, nothing but a waſteful ſcene of tumult and diſorder be preſented to our view, yet, when the fury of thoſe flames, which have been ſtruggling for a paſſage, has abated, every thing then returns to its original ſtate of reſt, and thoſe various melted ſubſtances, which but juſt before were in the wildeſt ſtate of chaos, will now ſubſide, and cool with a degree of regularity utterly unattainable in our elaboratories,

and

and ſuch as may eaſily be conceived capable of producing all the beauty and ſymmetry of a Giant's Cauſeway.

A SECOND objection ariſes from hence, that the currents of lava which have iſſued from Ætna and Veſuvius, within the memory of man, have never been known to exhibit this regularity of arrangement. It is therefore ſaid that experience does abundantly prove the fallacy of the volcanic hypotheſis.

IN reply to this we are told, that it is not in the erupted torrents of theſe volcanos we are to look for the phænomena of cryſtallization, but in the interior parts of the mountains themſelves, and under the ſurface of the earth, where the metallic particles of the lava have not been dephlogiſticated by the acceſs of freſh air, and where perfect reſt, and the moſt gradual diminution of temperature, have permitted the parts of the melted maſs to exert their proper laws of arrangement, ſo as to aſſume the form of columnar lava: That we muſt wait, until thoſe volcanic

mountains which at preſent burn with ſo much fury, ſhall have compleated the period of their exiſtence; until the immenſe vaults, which now lie within their bowels, no longer able to ſupport the incumbent weight, ſhall fall in, and diſcloſe to view the wonders of the ſubterranean world: And then may we expect to behold all the varieties of cryſtallization, ſuch as muſt needs take place in theſe vaſt laboratories of nature; then may we hope to ſee banks and cauſeways of baſaltes, and all the bold, and uncommon beauties, which the abrupt promontories of Antrim now exhibit.

It is ſtated as a third objection, that according to this hypotheſis, the baſaltes muſt have been reduced to a perfect ſtate of fluidity, in order to permit the phænomena of cryſtallization to take place, but, that there is no reaſon for believing it ever could have been ſubjected to any intenſe action of fire, ſo as to be reduced to a ſtate of thin fuſion, becauſe it does not contain air-holes, like the lava, nor poſſeſs thoſe marks of vitrification,

cation, which attend a very moderate heat in our laboratories.

THE firſt part of this objection is certainly ill-founded, though advanced by Wallerius, and other eminent mineralogiſts. All the baſaltes, which I have ever ſeen, does, in one part or another of its ſubſtance, always exhibit air-holes; and it is remarkable that even the pillars of our Giant's Cauſeway, which are ſingularly compact, have their upper joints conſtantly more or leſs excavated, ſo that this part of the argument does rather plead in defence of the volcanic origin of the baſaltes.

WITH reſpect to the want of all marks of vitrification, we are to conſider that ſubſtances in fuſion are very differently affected, in proportion as they are more or leſs expoſed to the acceſs of freſh air, the preſence of this element being abſolutely neceſſary in order to deprive a body of its phlogiſton.

THUS,

THUS, metals which may be readily vitrified by expoſure to heat, and the free afflux of air, will yet bear the moſt intenſe action of fire in cloſe veſſels, without being deprived of that principle on which their metalliety depends, and are therefore in this ſituation incapable of being vitrified. The baſaltes may therefore have been ſubjected to a very great degree of heat, within the bowels of the earth, and yet ſhew no marks whatever of vitrification, and hence it may be explained, how it comes to paſs that the iron principle of the baſaltes ſtill retains its phlogiſton, acting ſo ſenſibly on the magnetical needle.

A FOURTH objection is derived from hence, that in many of the countries where the baſaltes moſt abounds, there are no traces whatever of thoſe bold and deciſive features which conſtitute the diſtinguiſhing characteriſtic of a volcanic mountain; its lofty pointed form, its unfathomable crater, and many other circumſtances that ſtrike the ſenſes very forcibly at Ætna and Veſuvius.——

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The baſaltes, therefore, is affirmed to be a foſſil extenſively ſpread over the ſurface of the earth, and where it is found in the neighbourhood of volcanic mountains, it is ſaid we ſhould ſuppoſe theſe to be accidentally raiſed on a baſaltic ſoil, rather than to have created it.

It muſt be confeſſed that volcanic mountains are not always found to attend the baſaltes, at leaſt there do not appear any direct veſtiges of them in the neighbourhood of the Giant's Cauſeway in Ireland.

But the advocates of the ſyſtem are not much embarraſſed with this difficulty; according to them, the baſaltes has been formed under the earth itſelf, and within the bowels of thoſe very mountains, where it could never have been expoſed to view, until by length of time, or ſome violent ſhock of nature, the incumbent maſs muſt have undergone a very conſiderable alteration, ſuch as ſhould go near to deſtroy every exterior volcanic feature. In ſupport of this it may be

obſerved

obſerved that the promontories of Antrim do yet bear very evident marks of ſome violent convulſion which has left them ſtanding in their preſent abrupt ſituation; and that the iſland of Raghery, and ſome of the weſtern iſles of Scotland, do really appear like the ſurviving fragments of a country, great part of which might have been buried in the ocean. It is further added, that though the exterior volcanic character be in great meaſure loſt in the baſaltic countries, yet this negative evidence can be of little avail, ſince the few inſtances where the features have been preſerved afford a ſufficient anſwer to this objection.

THUS the Montagne de la Coupe in France ſtill rears its pointed top to the Heavens, retains its deep crater, and bears every characteriſtic of its volcanic origin; and this mountain is obſerved to ſtand on a baſe of baſaltic pillars, not diſpoſed in the tumultuary heap into which they muſt have been thrown by the furious action of a volcanic eruption, tearing up the natural ſoil of the country,

but

but arranged in all the regularity of a Giant's Cauſeway, ſuch as might be ſuppoſed to reſult from the cryſtallization of a bed of melted lava, where reſt, and a gradual refrigeration, contributed to render the phænomenon as perfect as poſſible.

FIFTHLY. It is obſerved by Monſieur Faujas de St. Fond, that at the foot of the mountain of Mezinc, in the province of Velay, a range of baſaltic pillars ſtands ſupported on a bed of foſſil coal, with a very thin ſtratum of clay, not more than a few inches thick, interpoſed; now that this inflammable body of coal ſhould have remained uninflamed, under a maſs of melted lava, thirty feet thick, ſeems highly improbable, and therefore it is evident, ſay the adverſaries of the ſyſtem, that the baſaltes could not have derived its origin from fire.

IN anſwer to this plain and weighty objection, it is affirmed, that no ſubſtance in nature can be conſumed by fire without the acceſs of atmoſpheric air; that fire may be paſſed

paſſed through inflammable air itſelf, without exciting actual inflammation, unleſs the atmoſphere lend its aſſiſtance. Hence it cannot appear ſtrange that a bed of coal might have ſurvived in the neighbourhood of a volcano, and even under a maſs of fluid lava, which, by reſting on it, would prevent every poſſible approach of freſh air, ſo abſolutely neceſſary to its being inflamed. It is certain that coal may be expoſed to the violent action of fire, in a cloſe veſſel, without being conſumed, or even ſuffering any material alteration, and therefore it is believed that this particular inſtance ought not to be held of weight ſufficient to overturn a ſyſtem, in ſupport of which ſo many reaſonable and almoſt certain proofs concur.

SUCH are the difficulties which are thought to embarraſs the volcanic theory of the baſaltes. In your excellent judgment I am certain they will bear their juſt value, founded on an extenſive knowledge of nature and her operations. But among the generality of mankind their weight will be exceedingly various.

In

In reaſonings concerning natural phænomena, the ſtandard of truth is extremely vague and equivocal. Climate bears here a more powerful influence than can well be imagined; ſo that it is not uncommon to find an opinion univerſally adopted by the inhabitants of one country, while thoſe of the neighbouring kingdom ſhall join as univerſally to reprobate it.

THUS the Neopolitans, accuſtomed from their infancy to the wild ſcenes of horror and deſolation which abound in a ſoil ravaged by volcanic fire, and to ſee as it were a new world ſuddenly raiſed on the ruins of their country, have their warm imaginations filled with the gigantic idea of this powerful principle, which to them appears adequate to the production of every thing that is great and ſtupendous in nature. How different are the ſenſations and opinions which prevail in the native of our temperate iſland! To him the ſound of thunder is uncommon, an earthquake is almoſt a prodigy, and the fury of

ſubterranean

ſubterranean fire is utterly unknown. He beholds nature purſue her calm and ſteady courſe with an uniformity almoſt uninterrupted; he views the ſame objects unchanged for a long ſeries of years; the ſame rivers to water his grounds, the ſame mountains ſupply food for his flocks, the ſame varied line of coaſt continues through many ſucceſſive ages to bound his country, and to ſet the waves of the foaming ocean at defiance; hence he naturally proceeds to extend his ideas of regularity and ſtability over the whole world, and ſtands utterly uninfluenced by thoſe arguments of change in the earth, which to the inhabitant of a warmer climate appear abſolutely deciſive.

In this manner are the prevailing opinions, even among the philoſophers of moſt countries, generally founded on partial analogies; and it requires a vigorous mind, as well as an extenſive and clear underſtanding, to prevent our being miſled by the ſpecious arguments and dangerous concluſions which have

have been derived from ſuch deceitful ſources, many of them plainly tending to multiply falſe opinions, and to ſubvert the only true principles of religion and morality.

LETTER

LETTER XII.

Portruſh, September 10, 1784.

DEAR SIR,

IF the volcanic theory of the baſaltes be well founded, and no doubt many of the arguments in favour of it are extremely plauſible, a ſcene of horror is preſented to our view, which muſt ſurely fill us with aſtoniſhment; ſince on this ſyſtem it will be found, that there is hardly a country on the face of our globe which has not at ſome time or other been waſted by the fury of ſubterranean fire.

IF, again, thoſe apparent veſtiges of marine productions, which are obſerved indiſcriminately

nately ſcattered through the earth, at all depths below its ſurface, and on the ſummits of its higheſt mountains, be eſteemed ſufficient proofs of the preſence of the ocean in thoſe places, a ſcene, no leſs wild and uncommon than the former, riſes before our imagination; in which the products of the equator and the poles appear to be jumbled together, in a manner incapable of being explained by any of the known analogies of nature.

FROM obſervations ſuch as theſe, where in truth every thing is inexplicable, many of the modern philoſophers, chiefly indeed of the French nation, have become warm admirers of the old brute atoms of Epicurus, or the myſterious plaſtic principle of the ſtoics, forming to themſelves ſyſtems of nature, in which an intelligent cauſe ſeems to be of all others the leaſt neceſſary; ſyſtems in which blind deſtiny alone is the active ſpring of life and motion.

THUS

THUS are the ſources of religion and morality effectually cut off at one blow; and mankind deprived of thoſe preſent bleſſings, and that delightful hope of future happineſs, which they fondly imagined to be rightly founded on their natural inſtincts, and ſupported by the faireſt deductions of reaſon.

IT is the buſineſs of natural hiſtory to collect, as extenſively as poſſible, all the phænomena of nature, to compare ſuch of them as bear any reaſonable ſimilitude, and from their general analogies to derive concluſions which may benefit our fellow-creatures, either as diſcoveries uſeful in common life, or as ſpeculative truths ſuited to improve and enlarge the underſtanding. In this point of view it is a ſcience which merits the honourable praiſe of mankind; and is certainly inferior to none in the copious ſources of delight and improvement which it may afford to a rational mind.

SURELY it is moſt unaccountable, that a ſtudy which in this character appears ſo lovely

and engaging, ſhould nevertheleſs have been purſued upon ſuch perverſe principles, and with ſuch miſguided views, as to lead to conſequences equally falſe in their own nature, and ruinous to the welfare of any ſociety where they may become univerſally prevalent.

I HAVE been accidentally led to make a few reflections on this ſubject, by the peruſal of ſome foreign writers on natural hiſtory, who have unfortunately applied the proofs of thoſe inexplicable changes which may poſſibly have taken place in the earth, and indeed all their negative knowledge of nature, for the purpoſe of diſproving the exiſtence of its admirable author; as if arguments derived from the depths of human ignorance could, with any reaſon, be eſteemed capable of overturning ſuch poſitive truths as the faculties of mankind are entirely adequate to apprehend.

WHEN men chuſe to build their opinions on things which they do not rightly underſtand,

ſtand, rather than on truths which come clearly within their comprehenſion, it can hardly happen that they will not run into very groſs miſtakes; becauſe, as the number of errors on any ſubject is plainly without limits, the chance is little leſs than infinite, that ſuch reaſoners will fall into the unfathomable abyſs of falſehood.

SUCH has been the fate of the author of a French work, *Sur la Nature*, and indeed of every follower of that pernicious ſchool of modern philoſophy, which, rejecting all conſideration of final cauſes, and deſpiſing thoſe ſimple and obvious analogies that lead to the moſt uſeful and ſatisfactory truths, has choſen rather to purſue others, which neither its diſciples, nor the reſt of mankind, are in any reſpect ſuited to inveſtigate *.

* "Il eſt au deſſous de Dieu d'agir pour une fin."—*Vide Des Cartes Philoſoph.—Maupertuis Eſſai de Coſmologie.—Buffon Theorie de la Terre.—Robinet Sur la Nature, &c. &c.*

PERHAPS an example may ſerve to render me more intelligible, and to point out the general fallacy of this unhappy ſpecies of reaſoning.

THERE can be no doubt that the teleſcope, with all its preſent improvements, is the reſult of a moſt happy application of uncommon ſkill and ingenuity, contriving and combining all the various parts and movements of that curious machine, for the excellent purpoſe of aſſiſting viſion.

IN proportion as theſe improvements were gradually invented, and applied to uſe, during a long ſeries of years; when each ſucceſſive diſcovery was brought to the utmoſt extent of its perfection, mankind then obſerved that the human eye, in a very ſuperior manner, enjoyed that particular advantage which they had ſought after with ſo much art and induſtry, exhibiting to view a perfect achromatic inſtrument of viſion, adapting itſelf with ſurprizing facility to the different brightneſs of its objects, and to a vaſt variety of diſtances.

AT

At the laſt, a defect was diſcovered in teleſcopes, ariſing from the ſpherical figure of the glaſſes; in conſequence of which, the focus of thoſe rays which fall near the limb of the glaſs, and of ſuch as paſs near to its center, do not coincide. This defect, after various fruitleſs attempts to obviate it, has for many years been given up by the moſt ingenious artiſts as irremediable *. But though men have, in this inſtance, found that there are bounds placed to their utmoſt ſkill and ingenuity, yet have they learned this uſeful truth, that there are no diſcoverable limits ſet to the powers of that admirable cauſe which formed the human eye; this error being there entirely corrected, in

* The moſt probable means diſcovered, of late years, for correcting theſe ſpherical errors, has been offered to the public by that excellent Britiſh artiſt, Mr. Ramſden, who conceives them capable of being in great meaſure removed in the eye-glaſſes of teleſcopes (where they are moſt ſenſibly felt) by ſuch an adjuſtment of the inſtrument as that the image formed by the object-glaſs ſhall fall as near as poſſible to the eye-glaſs.—*See Philoſophical Tranſactions of the Royal Society of London, A. D.* 1782.

the

the curious conſtruction of the cryſtaline humour, the principle refracting lens of the organ of viſion; which, gradually encreaſing in denſity from the limb toward the middle, does by this wonderful variation of its refractive power in one reſpect, counteract the errors which would have ariſen from the other conſideration.

THIS happy union of different parts and movements, as well in the natural, as in the artificial machine, each attaining its own particular end, and all together without confuſion or interference, compleating one greater and more excellent effect,—this, I ſay, reaſonable men denominate a work of deſign; and as they affirm that the teleſcope is an inſtrument formed to aſſiſt viſion, in conſequence of various *means*, duly connected, by an inviſible cauſe (for it is plain that there is ſome moving principle in man, which is neither eyes, ears, hands or head, neither the *tout enſemble* of all theſe, nor in any reſpect the object of our ſenſes:) ſo do they believe that the human eye is an inſtrument made

for

for the uſe of man, by an exceeding apt combination of intermediate cauſes, wonderfully and moſt unaccountably connected together by one, great, wiſe, and good cauſe; who is neither the eye itſelf, nor any part of its mechaniſm, nor at all the object of our ſenſes; but only viſible to us through the beauty and wiſdom of the works of creation, in the ſame manner as thought and intelligence in man are known to us through thoſe motions and effects daily produced before us, which we do always ſuppoſe to reſult, originally, from a principle in ſome ſort reſembling our own minds.

FROM hence, and a thouſand other ſimilar analogies, for apprehending which our faculties are admirably ſuited, mankind have reaſonably inferred the exiſtence of *one*, *ſuperior*, *intelligent*, *good* being; who is every where preſent; whom we ſee, and feel, and hear, every moment of our lives, in the viſible works of nature, as we do in particular circumſtances hear, and feel, and ſee, other beings whom we denominate men.

To

To this reaſoning, which does not in any reſpect appear uncandid or deluſive, the author of the treatiſe, *Sur la Nature*, warmly objects.—What! the eyes made for viſion, which in many inſtances fail and become blind?—The teeth and jaws made to grind food, which ſo often looſen, and refuſe to perform their office?—The earth formed to ſupport its inhabitants, while it contains volcanos which may have deſtroyed them by fire? Or an ocean, which has overwhelmed them under its waters?

THESE are ſome of the objections of that extraordinary writer, and this the general mode of argument, unhappily adopted on the Continent by too many of thoſe who have obtained the honourable title of philoſophers: A falſe ſpecies of reaſoning, in which the poſitive parts of human knowledge are moſt ſophiſtically ſupplanted by what is purely negative—In which a man is required to judge of the truth of what he knows, by thoſe other parts of nature where he is avowedly ignorant.

FROM

FROM principles ſuch as theſe, the Chriſtian Religion has been haſtily rejected; becauſe the population of America, and the accidental qualities of its inhabitants, could not immediately be explained by ſpeculative men, who had no other data whereon to reaſon, except the imaginary extent of their own genius, together with an entire ignorance of the ſituation of that continent, and the qualities of its inhabitants *.

* The proximity of America to the continent of Aſia is now perfectly aſcertained by the Britiſh navigators.—The confident aſſertion of modern philoſophers, that its inhabitants were beardleſs, is from many quarters proved to be falſe; and there is every reaſon for believing that their copper colour, and other peculiarities, are altogether the effect of ſoil and climate, ſince the progeny of the Europeans has been found to ſuffer very conſiderable changes in all theſe circumſtances, even during the courſe of thoſe few generations which have paſſed ſince their firſt eſtabliſhment there. So that in theſe inſtances, revealed religion, ſo far from apprehending danger from the diſcovery of truth, and the improvement of human knowledge, has only ſuffered from the ignorance or miſinformation of philoſophers.

From the ſame deceitful ſource of reaſoning, this beautiful world, ſo aptly formed, ſo wiſely moved, ſo bountifully and yet ſo variouſly adapted to maintain its different inhabitants, that the native of every country from the Equator to the Poles, finds cauſe to bleſs his ſituation, and to boaſt of comforts unknown in other climates. This curious ſtructure, the delight and wonder of the beſt and wiſeſt men in every age, has been condemned by a few preſumptuous ſophiſts, as the work of blind deſtiny, acting through the preſent elements of nature, becauſe there are many of its principles and movements of whoſe uſe they are ignorant;—becauſe there appear to be veſtiges of the ravages of fire, or the inundations of the ocean, which they are not able to explain.

It is moſt certain, that the laws of motion which now exiſt, could not have produced this world in the beginning, neither are they capable of continuing it for ever in its preſent ſtate.

THE interior ſtructure of the earth, whereby its various foſſil ſubſtances, though differing exceedingly from each other in ſpecific gravity, though not arranged according to any regular law of ſituation, do yet conſtitute a world ſelf-balanced, a ſphere whoſe center of gravity coincides with its center of magnitude (without which all its motions muſt have been in an extreme degree irregular) evidently demands a firſt cauſe, which neither acts blindly, nor of neceſſity.—A blind principle is not wont to labour in defiance of all chance; neither do mechanical cauſes uſually produce their effects in contempt of the eſtabliſhed laws of matter and motion.

THE gradual aſcent of our continents from the ſhores of the ocean, toward their mediterranean parts, ſo neceſſary for collecting the rains of Heaven, and giving birth and courſe to thoſe rivers which beautify and fertilize the earth. This exterior form, without which the vapours of the ſea would have

have aſcended to the clouds in vain, plainly requires the interference of ſome principle ſuperior to any of the known elements of nature. Whatever the followers of Epicurus may think of theſe mighty elements, no reaſonable man will ever believe that the waves of the ocean could have created a country whoſe ſoil lies far above the level of its waters; or that the fury of volcanic eruptions have produced an effect, ſo general, that we are rather led to infer the caſual exiſtence of former volcanos, in particular places, becauſe of ſome apparent interruption to this univerſal regularity of form.

THE projectile force by which the earth was in the beginning made to move round the center of light and heat;—its diurnal rotation, duly diffuſing this light and heat over its ſurface;—the inclination of its axis to the plane of the ecliptic, whereby the tropical climates receive fewer of the ſun's rays, while the inhabitant of the poler circle

enjoys

enjoys a larger ſhare*: All theſe effects, far ſurpaſſing the preſent powers of nature, moſt aptly combined together, working in concert without interference or diſorder, for the attainment of *one*, *great*, and *good*, and *excellent* end, clearly prove that this world has been produced by *one*, *powerful*, *intelligent*, and *benevolent* principle, utterly unlike to any mechanical cauſe which does now exiſt, or that can be conceived to exiſt.

MECHANICAL cauſes, ſuch as we are acquainted with, evidently tend to deſtroy the preſent form of the world; and thereby afford the ſtrongeſt proof that it is not by its conſtitution immortal.

SIR Iſaac Newton has demonſtrated, that the perturbing forces which take place in the ſolar ſyſtem, muſt in due time deſtroy the planetary motions, unleſs the firſt mover of all things ſhall chuſe to interfere. And it

* Vide Keil's Phyſ. Eſſays.

is

is ſufficiently evident, that the ſlow but certain operations of heat and cold, together with the continued action of the air and ſtorms, are capable of breaking and changing the moſt firm bodies, even the hardeſt rocks; while the numerous rivers on the earth's ſurface, and the waves which waſh its ſhores, perpetually labour to bear all theſe ſubſtances into the bottom of the ocean, and thereby to reduce all things to a level ſituation.

SINCE then the earth yet continues to circulate with regularity round the ſun, notwithſtanding the perturbing forces of the planets—ſince all the countries on its ſurface ſtill retain their elevated form, in oppoſition to thoſe boaſted mechanical cauſes, that labour inceſſantly to deſtroy it—ſince its impetuous rivers which purſue their courſe toward the ocean, have not yet ſmoothed thoſe abrupt and precipiceous cataracts, over which they ruſh with ſuch unbridled fury, it is plain, either that the world, as we now ſee it,

it, is but of a ſhort duration; or elſe, that ſome ſaving hand has interfered, to retard the progreſs of cauſes which in ſufficient length of time muſt needs produce their effects.

If we caſt our eyes over the annals of the world, we ſhall find in the hiſtory of the human race, a clear and deciſive evidence in favour of thoſe general truths which our religion teaches, concerning the duration of the earth and its inhabitants. The evident marks of novelty in all thoſe arts and ſciences that are the offspring of experience: The wonder and terror with which the earlier philoſophers (though in other reſpects well informed men,) were wont to behold many of thoſe natural appearances, which longer obſervation has ſhewn to be neither uncommon nor dangerous: The general defect of all hiſtories and traditions antecedent to a certain period at which the Jewiſh writings affirm the world to have been deſtroyed by water: Theſe cogent circumſtances afford the plaineſt proof that

that the human race has not exiſted here for many ages.

THERE is not now a nation on the earth, neither has there been one for theſe two thouſand years paſt, whoſe moſt remote traditions extend, with any degree of probability, beyond that memorable period of the univerſal deluge, which is recorded in the ſacred writings; ſo that whatever Monſ. Voltaire, and others, may aſſert concerning the eternity of the world, its motions, or its inhabitants, they will find but few rational men to adopt his wild ſyſtem of aſtronomy, or who can be perſuaded to believe that the ſun ever roſe in the weſt, or that the Babylonians made obſervations on that luminary ſome millions of years ago, when it was at the north pole *.

PERHAPS

* Monſ. Voltaire, and after him the Abbe Reynall, believes that the earth has an unknown motion round one of its equatorial diameters, in ſuch ſort that its axis performs an entire revolution in the ſpace of four millions

PERHAPS you will ſay, that ſuch language as this is ſilly and childiſh, beneath the name of philoſophical, and unworthy of any anſwer—yet I can aſſure you it is the general language of that miſerable ſchool of modern philoſophy, which ſearches for the moſt unknown motions in nature, to explain thoſe that are beſt known;—which breaks fragments from the ſun by chance, and then

millions of years. Voltaire's proofs of this motion are founded on an obſervation of the obliquity of the equator and ecliptic, ſaid to have been made by Pythias about two thouſand years ago; on the general accounts to be met with in Ovid's Metamorphoſes of ſtrange revolutions having formerly taken place on the earth's ſurface; and on a wild fable of the Egyptians, affirming that the ſun roſe twice in the weſt within the memory of their nation.——Nay, this extraordinary philoſopher ſeems to imagine it not very improbable that the poles themſelves may travel over different parts of the earth's ſurface; and it ſeems but a ſlight objection to this belief, that the oldeſt monuments in the world, the pyramids of Egypt, are accurately ſituated to face the cardinal points of the compaſs, the ſtability of which cardinal points entirely depends on the continuance of the poles of the earth in the ſame preciſe ſpot of the ſurface.

myſteriouſly forms them into habitable worlds; —which makes the ocean to act where it is not *;—which quotes the fables of Ovid, or the tales of the Egyptians, as its beſt authority in natural hiſtory †;—which utterly rejects the delightful and profitable purſuit of final cauſes ‡;—and holds the moſt precious moments of life to be well employed in endeavours to diſcover the thoughts and amuſements of trees and ſtones ‖.

If this be wiſdom, we, my friend, have reaſon to boaſt that we are not wiſe: If theſe be the vaunted fruits of freedom of thought, we have good cauſe indeed to rejoice that we are not free; that we ſtill retain our dependance on a wiſe and bountiful Providence; and have not yet fallen

* Vide Buffon Theorie de la Terre.

† Vide Voltaire's Period of 4,000,000 Years.

‡ Vide Des Cartes, Maupertius, &c.

‖ Vide Robinet Sur la Nature.

into

into that univerſal anarchy of opinion, where each individual labours to enthrone and to adore every wild phantom of his own wandering imagination, juſt as folly or caprice may chance to direct his choice.

FINIS.