

Letters on Iceland: containing observations on the civil, literary, ecclesiastical, and natural history; antiquities, volcanos, basaltes, hot springs; customs, dress, manners of the inhabitants, &c.; &c; / Made, during a voyage undertaken in the year 1772, by Joseph Banks, assisted by Dr. Solander, Dr. J. Lind, Dr. Uno von Troil, and several other literary and ingenious gentlemen. Written by Uno von Troil. To which are added the letters of Dr. Ihre and Dr. Bach [i.e. Bäck] to the author, concerning the Edda and the elephantiasis of Iceland: also Professor Bergman's curious observations and chemical examination of the lava and other substances produced on the island. With a new map of the island, and a representation of the remarkable boiling fountain called by the inhabitants geyser.

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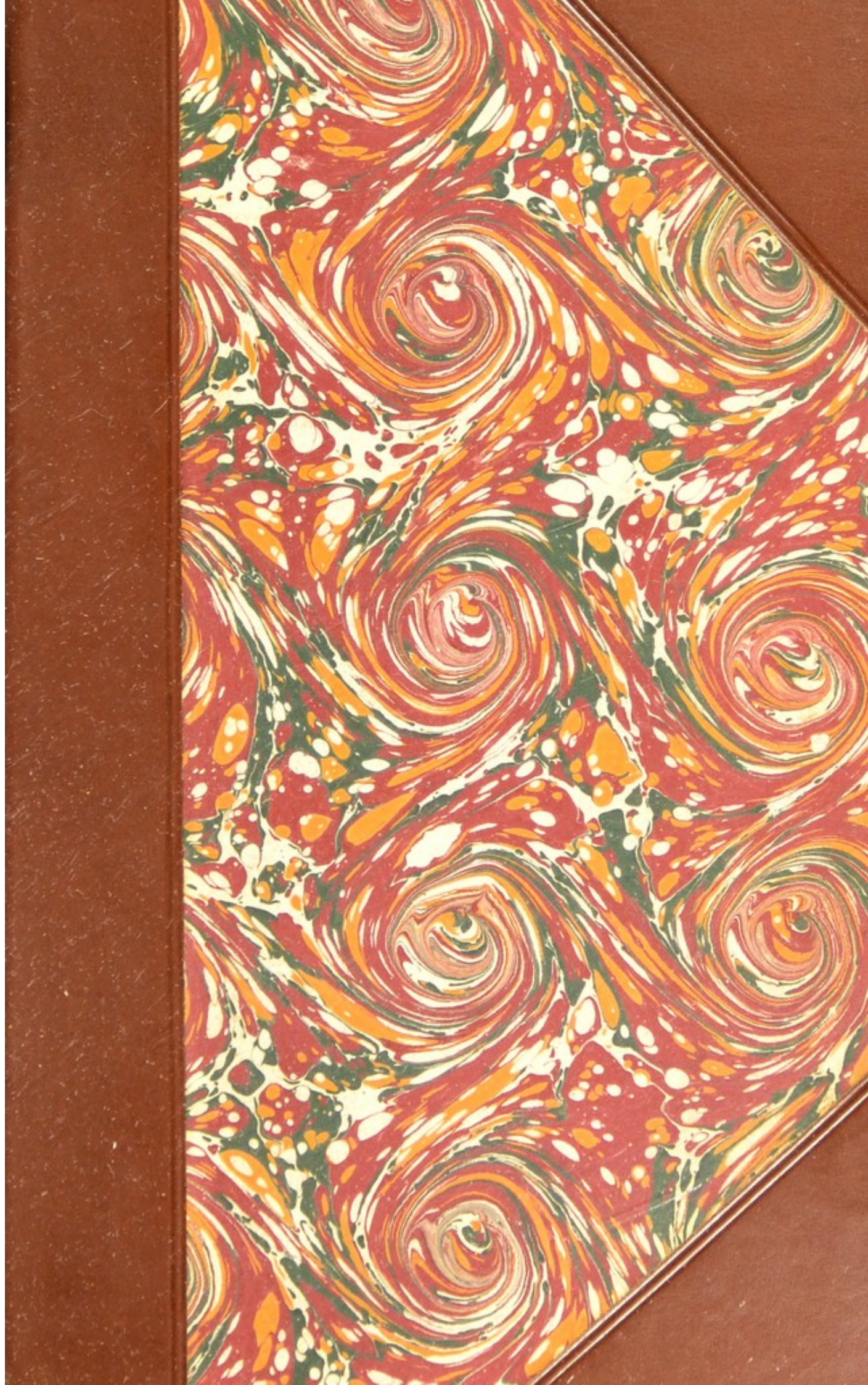
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LETTERS
ON
ICELAND:
CONTAINING
OBSERVATIONS
ON THE

Civil, Literary, Ecclesiastical, and Natural History; Antiquities, Volcanos, Basaltes, Hot Springs; Customs, Dress, Manners of the Inhabitants, &c. &c.

MADE,

During a Voyage undertaken in the Year 1772,

By JOSEPH BANKS, Esq. F. R. S.

Assisted by

Dr. SOLANDER, F. R. S. Dr. J. LIND, F. R. S.
Dr. UNO VON TROIL,

And several other Literary and Ingenious GENTLEMEN.

Written by UNO VON TROIL, D. D.

First Chaplain to his Swedish Majesty, Almoner of the Swedish Orders of Knighthood, and Member of the Academy of Sciences at Stockholm.

TO WHICH ARE ADDED

The LETTERS of Dr. IHRE and Dr. BACH to the Author, concerning the Edda and the Elephantiasis of ICELAND:

A L S O

Professor BERGMAN's Curious Observations and Chemical Examination of the Lava and other Substances produced on the Island.

With a new Map of the Island, and a Representation of the remarkable Boiling Fountain called by the Inhabitants GEYSER.

L O N D O N :

PRINTED BY AND FOR W. RICHARDSON, IN THE STRAND;

A L S O

FOR J. ROBSON, IN NEW BOND STREET, AND N. CONANT,
IN FLEET STREET.

M D C C L X X X.

LETTER 3

CONTENTS

INTRODUCTION

LETTER I
On the Effects of Fire in Iceland
page 1

LETTER II
Of Iceland in general
18

LETTER III
On the Constitution of the Country
36

LETTER IV
Of the Arrival of the Norwegians, the
Government and Laws in Iceland
59

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LETTER V
Concerning Ecchymosis in Ice
74

LETTER VI
Of the Character and Manner of Life
of the Icelanders
83

CONTENTS.

INTRODUCTION.

LETTER I.

On the Effects of Fire in Iceland
page 1

LETTER II.

Of Iceland in general - 18

LETTER III.

On the Constitution of the Country 36

LETTER IV.

*Of the Arrival of the Norwegians, the
Government and Laws in Iceland* 59

LETTER V.

*Concerning Ecclesiastical Affairs in Ice-
land* - - - 74

LETTER VI.

*Of the Character and Manner of Life
of the Icelanders* 83

LETTER VII.

Of the Dress of the Icelanders page 94

LETTER VIII.

Of the Houses and Buildings of the Icelanders - - - 99

LETTER IX.

Of the Food of the Icelanders - 103

LETTER X.

Of the Employment of the Icelanders, and their Chronology - 113

LETTER XI.

Of the Diseases of Iceland - 119

LETTER XII.

Of Fishing and Fowling, and the Breed of Cattle in Iceland - 124

LETTER XIII.

Of the Trade of Iceland - 148

LETTER XIV.

Of Icelandic Literature - 153

LETTER XV.

Of Printing in Iceland page 181

LETTER XVI.

Of the Remains of Antiquity in Ice-
land - - - 187

LETTER XVII.

Of Icelandic Poetry - 195

LETTER XVIII.

Of the Volcanos in Iceland - 220

LETTER XIX.

The subject continued - 231

LETTER XX.

Of Mount Heckla - 239

LETTER XXI.

Of the hot spouting Water Springs in Ice-
land - - - 245

LETTER XXII.

Of the Pillars of Basalt ; to which is
subjoined Mr. Banks's curious ac-
count of the island of Staffa - 266

LETTER XXIII.

From Chev. IHRE to Dr. TROIL.—*Concerning the Edda* - page 289

LETTER XXIV.

From Chev. BACH to Dr. TROIL.—*Of the Icelandic Elephantiasis* - 319

LETTER XXV.

From Professor BERGMAN to Dr. TROIL.—*Of the Effects of Fire both at the Volcanos and the Hot Springs ; and also of the Basaltes* - 338

INTRODUCTION.

INTRODUCTION.

THE accounts of Iceland, which have hitherto made their appearance in the English language, are of such nature, that it would betray ignorance or partiality to recommend them to the public as satisfactory and faithful.

The first writer of any known history of Iceland in the present century, was John Anderſſon, afterwards Burgo-master of Hamburgh, who undertook a voyage to this not much-frequented island in a Greenland ship; but the authenticity of his performance is far from being such as may be relied on with confidence.

Niels Horrebow, a Danish astronomer, was sent to Iceland by the court of Denmark, on purpose to contradict, Anderſſon's account; he published some observations on Iceland, but from a too great desire to please his employers, he fell into the opposite
b error,

error, and paints all his objects with a glow of colouring, that does not exactly correspond with the truth.

In Richer's Continuation of Rollin's History is a history of Iceland, a most pitiful compilation, and full of the grossest errors that ever disgraced the historical page.

Under the authority of the Royal Society of Sciences at Copenhagen, Eggert Olafsen and Bjarne Povelsen, two men of learning, natives of Iceland, and residing in the country, travelled all over that island, and gave, in two volumes in quarto, a faithful and ample account of all that deserves the attention of the learned and curious, illustrated by numerous engravings: but though the performance is accurate and circumstantial, yet it is unfortunately clogged with repetitions, and the facts are recounted in so tedious and uninteresting a manner, that it requires a most phlegmatic temper, and a large fund of patience, to go through the whole of this work, for it is filled with a long and dull recital of events, methodized in the
most

most formal manner possible. It can therefore by no means be thought superfluous, that Dr. Von Troil has favoured the literary world with his interesting Letters on Iceland; a work which on account of its varied matter, and the great learning displayed every where for the instruction of the curious reader, deserves the warmest approbation of the public.

Men of talents and learning will, we flatter ourselves, think highly of this present performance by Dr. Von Troil, though perhaps it may be sometimes a little deficient in point of language.

The present translation has been made from the last German edition, published by Messrs. Troil and Bergman, with numerous additions and corrections; and though it is not ostentatiously recommended to the public for any elegance or accuracy of style, it may however be safely stated as a faithful translation from the original, and a work of real merit and utility.

We leave it to the unprejudiced reader to form a judgment of this performance, which is replete with variety of matter, treated on in an instructive and satisfactory manner; and likewise on the great learning relative to natural history, historical, antiquarian, and philological subjects, which are every where blended in the context of the following letters; and we are of opinion, that in respect to these points, this work requires no apology for offering it to the impartial public.

As to its utility, it will not be unnecessary to prefix a few observations on the importance of Icelandic literature.

The English language was originally so nearly related to that of Iceland, that we need only cast our eyes on a glossary, to see the affinity of both languages, and the great light the one receives from the other.

The Normans and Danes, who were during a considerable time masters of England, introduced into it many
 1 customs,

customs, laws, and manners, which would remain inexplicable ; but the Icelanders being originally descended from the same Normans, and living on an island which has very little intercourse with the rest of the world, have preserved their language, manners, and laws in their primitive simplicity ; nay, all the historical accounts of the North are contained in the historical sayings (*sagas*) of the Icelanders, which are very numerous, and and would be of very important service in the investigation of the origin of the language, manners, and laws of England. Nor can it be advanced that this kind of study could not be pursued amongst us for want of these historical monuments of the Icelanders ; since by the known indefatigable zeal for the promotion of all branches of literature, and the most disinterested generosity of Joseph Banks, Esq. P. R. S. one hundred and sixty-two Icelandic manuscripts have been presented to and are deposited in the British Museum.

The history of the northern nations, their divinities, religion, principles, and tenets, together with their poetry, present the philosophic reader with subjects worthy of his speculation; they at the same time account for many historical events, and for many a curious custom preserved by some one or other of the nations descended from the same root with these inhabitants of the north.

The subject of volcanos, and of the origin of certain kinds of stones and fossils, have of late attracted the attention of philosophers; but in my opinion, they are no where treated with so much candour, truth, and philosophical precision as in those remarks which the Chevalier Torbern Bergman sent to our author in form of a letter, and which he has here communicated to the public.

The whole island of Iceland is a chain of volcanos, the soil almost every where formed of decayed cinders, lava, and flags; and the numerous hot springs, especially that called *Geyser*, give full scope to the most
curious

curious remarks on these subjects, since they are here obvious in so many varied shapes, and for that reason become instructive. Lava and some other productions of nature have not been hitherto subjected to chemical processes: professor Berman therefore deserves the thanks of the public for his excellent letter, giving a very interesting account of his experiments on all the various fossils and natural productions of Iceland. The origin of basaltic pillars, such as form the Giant's Causeway in Ireland, the whole island of Staffa, and more especially Fingal's Cave, has of late been much spoken of by travellers and learned mineralogists. Some ascribe their regular configuration to crystallization: others pretend the subterraneous fire to be the cause of their regular columnar shape; but the ingenious Chevalier Torbern Bergman proves, by the most solid arguments, that the basalt pillars are no lava, or any ways related to volcanic substances, and that their regular columnar shape, he suggests, is owing to another,

ther cause, and by his reasoning renders it highly probable.

We are at the same time presented with a view of the *primitive earths*, that originally compound all earthy and stony bodies hitherto discovered on the surface of our globe; and their characters are here also set forth in the most easy and obvious manner by experiments.

This great and interesting circumstance alone would be sufficient to recommend the present performance to the perusal of chemists, mineralogists, and philosophers.

The letter of the Archiater Bach to Dr. Troil on the diseases of Iceland, contains the most curious and interesting observations for the use of medical gentlemen. In short, there is scarcely a class of readers who will not find instruction and entertainment in the ingenious performance of Dr. Uno Von Troil, the author of this book.

He is a Swede by birth, and descended of a noble family: his father, Samuel Von Troil, was archbishop of Upsal.

After

After having studied divinity, the oriental and northern languages and antiquities, together with the various branches of natural philosophy, he travelled, and visited Germany, France, England, and Holland.

During his stay in England he was introduced to Mr. Banks, who was then returned from his voyage round the world, and preparing to go on a second ; but that not taking place, he was prompted to make a short excursion towards the Western Islands and Iceland; and easily prevailed upon Dr. Von Troil to accompany him on this literary voyage.

After the return of Dr. Von Troil, he wrote letters to several learned men in his own country, eminent in the various professions and branches of literature and science, on the different matters he had observed in Iceland during his voyage ; they were at first only intended to satisfy the solicitations and curiosity of his friends, who wished to be made acquainted with whatever he had discovered worthy the notice of a literary

literary man, and that might likewise bid fair to afford amusement.

The senator Charles Count Schetfer, a man of a benevolent character, and who patronizes learning in all its branches, together with its professors, solicited our author to communicate them to the public: in compliance with which, they were published at Upsal in 1777 in octavo; and the next year after they appeared at the same place translated into German, very much enlarged with additions of the author and also of Chevalier Bergman.

Dr. Von Troil has for his talents, learning, and character been promoted in his native country to several places of honour and emolument, so that he may now be considered as the first man in Sweden in point of eminence in the ecclesiastical line, and in point of learning inferior to none: he has taken his degree of doctor of divinity, is principal chaplain to the king, president of the consistory, rector of the great church of Stockholm,

holm, and prelate of all the Swedish orders of knighthood.

These cursory hints were thought necessary for ushering his Letters on Iceland into the literary world; the public will, no doubt, be curious to know the particular observations made by a learned man on an island that Mr. Banks, one of the first characters of this country, thought deserving a nearer inspection by a voyage he undertook at a great expence, accompanied by several learned and ingenious men.

For the information of those who wish to be acquainted with all the publications that have appeared, to treat either at large of Iceland, or examine some of its particular objects, we have here subjoined a very curious and complete catalogue of them.

CATALOGUE

CATALOGUE of Writers on ICELAND.

- 1 **J**OACHIM Leo wrote some verses on Iceland in the German language, full of errors. There are four editions of them. Arngrim Jonæ, in his *Commentario de Islandia*, quotes the edition of 1561.
- 2 Jacobi Ziegleri *Scondia seu Descriptio Groenlandiæ, Islandiæ, Norvegiæ, & Sueciæ*. Francofurti 1575.
- 3 Jonsbogen (i. e. Jonsbook, an old book of laws) *Hoolum* (in Iceland.) 1578. 8vo. and several editions subsequent to it.
- 4 Arngrim Jonæ *brevis commentarius de Islandia. Hoolum* 1592. 8vo. and *Hafn* 1593. 8vo.
- 5 Ejusd. *Crymogæa seu rerum Islandicarum libri tres*. Hamburg. 1609, 1610, 1614, 1618, 1620, and 1630.
- 6 Blefkenii *Islandia f. populorum et mirabilium, quæ in ea insula reperiuntur, accurata descriptio*. Ludg. Batav. 1607. 8vo.
- 7 Angrim Jonæ *Anatome Blefkeniana*. Hoolum 1612. 8vo. and Hamburg 1613. 4to.
- 8 Dan Fabritius de *Islandia & Groenlandia*. Rostock 1616. 8vo.
- 9 Arngrim Jonæ *epistola pro patria defensoria*. Hamburg 1618. 4to. written in opposition to the preceding book.
- 10 Arngrim Jonæ *Apotribe calumniæ*. Hamburg. 1622.
- 11 *De regno Daniæ & Norvegiæ insulisque adjacentibus, tractatus varii collecti a Stephano Stephano*. Ludg. Batav. 1629. 12mo. from whence the part concerning Iceland is taken out, and printed separately with the title.
- 12 *Islandicæ gentis primordia & vetus republica*. Ludg. Bat. 1629. 12mo.
- 13 Arngrim Jonæ *Athanasia Gudbrandiana*. Hamburg 1630.

- 14 Peder Claussøn's Norriges og omliggende öars Beskrivelse. Kiøb. 1632. 4to. and Kiøb 1637. 8vo.
- 15 Arngrim Jonæ specimen Islandiæ hist. & magna ex parte chorographicum. Amst. 1643.
- 16 La Peyrere Relation de l'Islande, in a letter to Mr. de la Motte Vayer, dated 18 Dec. 1644. Is inserted in the Recueil des Voyages au Nord, tom. I. Amst. 1715. 8vo.
- 17 Wolfii Norrigia illustrata. Hafn. 1651. 8vo. and 4to.
- 18 Wolfii Norriges, Islands og Grönlands Beskrivelse. Kiöbhafn. 1651. 4to.
- 19 Hieronym. Megiseri Septentrio Nov-antiquus, sive die neue Nord-welt Island, Groenland, &c. Leipz. 1653. 12mo.
- 20 Edda Islandorum A. C. 1215, per Snorronem Sturlæ islandice conscripta, islandice, danice & latine edita, opera P. J. Resenii. Hafn 1665. 4to. together with
- 21 Philosophia antiquissima Norvego-danica dicta Voluspa, quæ est pars Eddæ Sæmundi, primum publici juris facta a P. J. Resenio. Hafn. 1665. together with
- 22 Ethica Odini, pars Eddæ Sæmundi, vocata Haaramal, edita per P. J. Resenium. Hafn 1665.
- 23 Theod. Thorlacii diss. chorographica historica de Islandia, præs. Ægid. Strauch. Wittent 1666 and 1670. 4to. item 1690. 4to.
- 24 Erixi Bartholini experimenta Christalli Islandici disdiaclastici. Hafn. 1669. 4to.
- 25 Voluspa. Kiöbenhavn. 1673. 4to.
- 26 Martiniere neue Reise in die nordischen Landschaften. Hamb. 1675. 4to. Translated from the English. There is likewise a French edition. Paris 1682.
- 27 Aræ Multistii Schedæ. Skalholt 1688. 4to. Oxford 1696. Kiob. 1733. 4to.
- 28 Landnama Bok. Skalholt 1688. 4to. Is likewise published at Copenhagen, with a Latin translation, notes,

- notes, and several indexes. *Islands Landnama-Bok*, h. e. *Liber originum Islandiæ*. Editio novissima, ex manuscriptis Magnæanis sumptibus perill. Suhmii. Havn. 1774. 4to.
- 29 Gahm de ratione anni solaris apud veteres Islandos. This memoir is printed at the end of *Aræ Schedæ*, in the Copenhagen edition.
- 30 Thordr Thorlaks Dill. de ultimo montis Hecklæ in Islandia incendio. Hafn. 1694.
- 31 Gahm de prima religionis in Islandia fundatione. Hafn. 1696.
- 32 Description du Nord. 1698. 12mo.
- 33 Nieuwe beschryvinge van Spitsbergen, Island, Groenland end de beygelegen Eylanden.
- 34 Einar Thorst. vita. Hafn. 1700.
- 35 Reise nach Norden, worinne die sitten, Lebensarten and Aberglauben der Norweger——and Islander accurat beschriebèn werden. Leipz. 1711. 12mo.
- 36 Blefkenii Historie van Lap-and Finland, hier is bygevoegt de beschryving van Is-en Groenland. Leuwarden 1716. 8vo.
- 37 Vettersten de Poesi Scaldorum Septentrionalium. Upsal. 1717. 8vo.
- 38 Relation om det foerskrekkelige Vandfall og exundation af Bierget Katlegiaa paa Island 1721. Copenhagen 1727. 4to.
- 39 Kort berättelse om berget Krabla paa Island, samt andre Dernefs intil grantsande Berg, Hwilka nyligen begynt at inspruta eld och brinna. This account of the burning of the mount Krabla was printed probably in the year 1727, at Stockolm, on four pages in 8vo.
- 40 Benedict Thorstenfon effterrettning om den jordbrand som 1724 og folgende Aar i Bierget Krafla og de dar omkring liggende Herreder har grasseret. Kiöbenhafn 1726. 8vo.
- 41 Olavi O. Nording Dill. de Eddis Islandicis. Upsal. 1735. 4to. Mr. Oelrichs at Bremen has reprinted this

- this Diss. in his *Opusculis Daniæ & Sueciæ litteratæ*, tom. I. 1774.
- 42 Joh. Dav. Koehler *prolusio de Scaldis seu poetis gentium arctoarum*. Altdorf 1738. 4to.
- 43 Er. Jul. Biörner, *Inledning til de Hfverborna Goeters gamla Hafder sar deles gotiska sprakets Forman och Sagornas Kanned om. seu, Introductio in Antiquitates Hyperboreo-Gothicas*. Stockholm 1738. fol.
- 44 Ejusd. *tractatus de Varegis heroibus Scandianis*. Stockholm 1743. 4to.
- 45 Lackmannus *de computatione annorum per hyemes priscis gentibus hyperboreis usitata*. Kiel 1744. 4to.
- 46 *De Yfverborna Atlingars Lara—Hyperboreorum Atlandiorum seu Suilogotorum et Nordmandorum Edda, hoc est Atavia, seu fons gentilis illorum & Theologiæ & Philosophiæ. Iam demum versione Suinonica donata accedente latina—ad MS. quod possidet Bibliotheca Upsaliensis—opera Joh. Gorfson. Ups. 1746. 4to. This edition of the Edda was not finished.*
- 47 *Islanska taxan*. Hoolum 1746. 4to.
- 48 John Andersson *Nachrichten von Island, Groenland, und der Strasse David*. Hamb. 1746. It appeared likewise translated into the Danish language. Copenh. 1748. A French translation has likewise been published by Mr. Sellius, 1751. 12mo. 2 vols.
- 49 *Oftroy foer det Islandske Societet*. Kiøb. 1747. 8vo.
- 50 *Avertissement om Anderssons Tractat om Island*. Kiøb. 1748. 8vo.
- 51 Joh. Thorkellssons *tillgift til Andersson om Island*. Kiøb. 1748. 8vo.
- 52 Eggerhard Olavius *Enarrationes historicæ de Islandiæ natura & constitutione*. Hafn. 1749. 8vo.
- 53 Ejusd. *Diss. de ortu & progressu circa ignem Islandiæ subterraneum*. Hafn. 1749. 4to.

- 54 Biarni Pauli Observationes de alga saccharifera maris Islandici. Hafn. 1749. 8vo.
- 55 Arnae Oddef. vita, inserted in the Nova literaria. Hafn. anni 1750.
- 56 De Gamla Normanners Patriarkaliska Lara pa Swenska och Lat. af Joh. Gooranffon. Stockholm 1750. 4to.
- 57 Olai Wormii Epistolæ. Hafn. 1751. 2 vols. 8vo.
- 58 Tilforladeliga efterretningar om Island med ett nytt Landkort, og 2 Aars metereologiska Observationer af Niels Horrebøw. Kiøb. 1750. 8vo. This performance is likewise translated into German 1752. 8vo. and into English.
- 59 Specimen Islandiæ non barbaræ, in nouellis literariis Hafnienfibus 1752.
- 60 Nachrichten von Island, a short abstract of Horrebøw's book inserted in a periodical paper called Beytragen zum Nutzen und Vergnugen. Greifswald 1753. 4to.
- 61 Erixi tentamen de nominibus & cognominibus Septentrionalium. Hafn. 1753. 8vo.
- 62 Th. Nicolai de comœatu Islandorum navali. 1753. 8vo.
- 63 Svein Solvefen Tyro Juris Islandicus. Kiøb. 1754. 8vo.
- 64 Vidalins Bref til Jon Arnesen de jure patronatus Islandorum, translated into Danish, and published by Magnus Ketilson.
- 65 Dissertatiuncula de montibus Islandiæ crystallinis, auct. Theodr Torkelli I. Vidalino, scholæ Skalholtensis eo tempore Rectore. Translated from the Latin MS. into German, and published in the Hamburg Magazine, volume XIII. N° 1. and II. 1754. 8vo.
- 66 Disquisitiones duæ historicæ antiquariæ. Prior de veterum Septentrionalium, imprimis Islandorum peregrinationibus; posterior de Philippia seu amoris equini apud priscos boreales causis——per Joh. Erixi. Lips. 1755. 8vo. The first is translated into

- into German, and inserted into Schlozer's Northern History. 1771. p. 556.
- 67 Ejusd. Specimen Observationum ad antiquitates Septentrional.
- 68 Ejusd. Commentarius de expositione infantum ad veteres Septentrionales.
- 69 Introduction à l'Histoire de Dannemark, par Mr. Mallet, à Copenh. 1755. 4to. to which a translation of the Edda is prefixed. The same is translated into English, 2 vols. 8vo. and into German. Greifswald 1765. 4to.
- 70 Joh. Snorronis de Agricultura Islandorum. Hafn. 1757. 8vo.
- 71 Hald Jacobsens efterretninger om de i Island ildsprudende Bierge. Kiøb. 1757. 8vo.
- 72 Ol. Eigilsson's Berettnelse om de tyrkiske Soerovere i. Island. Kioeb. 1757. 8vo.
- 73 Nic. Pet. Sibbern idea historiæ litterariæ Islandorum in Dreyer's Monumenta anecdota. I Tom. Lubecæ 1760. 4to.
- 74 Balle oekonomiska Tanker ofwer Island til hoyere betankning. Kiøb. 1760, 1761. 2 vols. 8vo.
- 75 Joh. Finnæus tentamen historico-philologicum circa Norvegiæ jus ecclesiasticum priscum, and
- 76 Ejusd. Curæ posteriores in hoc jus. Hafn. 1762 and 1765. 4to.
- 77 Thorsten Nicol. de commentu veterum Islandorum restituendo. Hafn. 1762. 8vo.
- 78 Joh. Arneson Inledning til den gamle og nya Islandske Rettegang, udgiven af T. Erichsen. Kiøb. 1762. 4to.
- 79 Ioach. Stechau de fide historica monumentor. Islandic. Lund. 1763.
- 80 Five pieces of Runic poetry, translated from the Icelandic language. London 1763. 8vo.
- 81 M. Olafsen's foerfoeg til Landraafnets forbedring i Island. Kiøb. 1765. 8vo.
- 82 Ejusd. Anmarkningar till Jons boks Danska ofwerfattelse. Kiøb. 1765. 8vo.

- 83 Egil Thorhallssens forfvar for sin ofwersfattelse. Kiøb. 1765. 8vo.
- 84 H. Finnsen efterrettning om tilgragelserne vid Bierget Hekla udi Island i April og folgende manader. Kioeb. 1767.
- 85 Olavii Syntagma de Baptismo veterum. Hafn 1769. 4to.
- 86 Breve om Agerdyrknings muelighed i Island fra Hans Finnsen 1769 and 1772.
- 87 Joh. Petersen om den faa Kallade Islandske skiorbiugg. Soroe 1769. 8vo.
- 88 Erichsen om Islands up Komst. Kioebenhafn 1770 4to.
- 89 Skuli Magnussøn um thann Islenska Garnspuna. Kiøb. 8vo.
- 90 Ol. Olafsens Islansk Urtagaards bok. Kioeb. 1770. 8vo.
- 91 Thor Oddefsons tanker om akurdyrkin paa Island. Kiøb. 1771. 8vo.
- 92 Iuel Norrlands Trompet.
- 93 Martefeld om Islands Huusholding med fedhe vahre og Hamborgs Kiodrogning. Kiøb. 1771. 8vo.
- 94 Ol. Olson um fiski-veidar og fiski-nettan. Kiøb. 1771. 12mo.
- 95 Upartiske tanker om det Islandske Handels-Kompagnie og dets farende Kiobmand. Kiøb. 1771.
- 96 Anmerkningar oever Compagniets Handel paa Island. Kiøb. 1771.
- 97 Lud. Harboe Tuende of handlingar om reformationen i Island.
- 98 Ejusd. History of the Islandic translation of the Bible.
- 99 Finnei Johannæi, Episcopi Diocefeos Skalholtinæ in Islandia, Historia Ecclesiastica Islandiæ. T. I. II. III. Hafn. 1772 & 1775.
- 100 Ion Olsson om den Islandske Handel. Kiøb. 1772. 8vo.
- 101 Bref til Hr. Cancellie Radet Lagerbring rorande then Islandske Edda (by Chevalier Ihre). Stock. 1772. 8vo.

- 102 Relation d'un Voyage dans la Mer du Nord par de Kerguelen de Tremarec. Amsterdam 1772. 4to.
- 103 Eggert Olafsens og Biarne Povelsens Reise igienem Island, 2 vols. Soroe 1772. 4to. It appeared likewise translated into German. Leipz. 1774 & 1775. 4to. 2 vols.
- 104 Steph. Thorasens de homicidis secundum leges Islandorum antiquas. P. I. Hafn. 1773.
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- 112 Vorlaufender Bericht und zugleich die Vorrede von der alten und raren Islandischen Edda, so über 700 Jahr und daruber in Norden bisher uner-

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This Catalogue contains all the writers of any consequence on Iceland, or on matters any way relative to, or concerning that country.

An
accurate & correct
MAP OF
ICELAND
compiled
from Surveys and
authentic Memoirs by
Messrs. Ericksen & Schoonning



LETTERS ON ICELAND.

* L E T T E R I.

To Professor BERGMAN.

On the Effects of Fire in Iceland.

S I R,

SINCE I am happily returned from a very pleasant summer's excursion through the western islands of Scotland, to Iceland and the Orkneys, it is with peculiar pleasure that I take this opportunity of assuring you of my esteem and friendship. It is probably not unknown to you, that Mr. Banks and Dr. Solander have been disagreeably disappointed when they were on the point of setting out on a new voyage round the world last summer. How-

* This letter was first published in the year 1773, in the Upsala newspapers, N^o 3, 4, 6, and 8.

ever, in order to keep together and employ the draughtsmen and other persons whom they had engaged for their voyage to the South-Sea, they resolved upon another excursion. It was impossible to chuse a better one than that to Iceland; and you may easily conceive, Sir, that though I was ready to set out on my return to Sweden, I did not hesitate a moment in accepting their offer to accompany them. To say the truth, I was glad to visit a country where I could not alone hope to find many remains of our ancient language, but where I was certain to see nature in a new point of view.

I have not been disappointed in either of my expectations; and I could never have found a happier opportunity than that of making this voyage in the company of Mr. Banks and Dr. Solander, of whom it would be unnecessary to say one word more, as they are both known so well to you, and to the learned and ingenious throughout Europe.

I know, Sir, that every information will be welcome to you, which concerns

cerns those objects that attracted my attention there ; and there is no one who would communicate this information to you with more pleasure than myself ; but as it would require too much prolixity to mention every thing, I shall only in this letter speak of the principal operations of fire in Iceland, a subject which, I am convinced, is one of the most important.

On our arrival in Iceland on the 28th of August 1772, we directly saw a prospect before us, which, though not pleasing, was uncommon and surprising. Whatever presented itself to our view bore the marks of devastation ; and our eyes, accustomed to behold the pleasing coasts of England, now saw nothing but the vestiges of the operation of a fire, heaven knows how ancient !

The description of a country, where quite close to the sea you perceive almost nothing but sharp cliffs vitrified by fire, and where the eye loses itself in high rocky mountains covered with eternal snow, cannot possibly produce such emotions as at first sight might

entirely prepossess the thinking spectator. It is true, beauty is pleasing both to our eyes and our thoughts ; but gigantic nature often makes the most lasting impressions.

We cast anchor not far from Bessetdr, the dwelling-place of the celebrated Steurleson, where we found two tracts of lava, called *Gorde* and *Hualeyre-Hraun* (for what we and the Italians call Lava, is called in Iceland *Hraun*, from *Hrinna*, to flow) of which particularly the last was remarkable, since we found there besides a whole field covered with lava, which must have been liquid in the highest degree, and whole mountains of turf. Chance had directed us exactly to a spot on which we could better, than on any other part of Iceland, consider the operations of a fire which had laid waste a stretch of ten or twelve miles*.

* The miles mentioned by Dr. Troil are always Swedish, ten and an half of which are equal to a degree on one of the great circles of the globe ; and therefore one Swedish mile is nearly equal to six English statute miles. Ten or twelve miles are 60 or 72 English miles.

We

We spent several days here, in examining every thing with so much the more pleasure, since we found ourselves, as it were, in a new world.

We had now seen almost all the effects of a volcano, except the crater, from which the fire had proceeded: in order therefore to examine this likewise, we undertook a journey of twelve days to mount Heckla itself; we travelled fifty or sixty miles* over an uninterrupted track of lava, and had at last the pleasure of being the first who ever reached the summit of this celebrated volcano. The cause that no one has been there before, is partly founded in superstition, and partly in the extreme difficulty of the ascent, before the last discharge of fire. There was not one in our company who did not wish to have his cloaths a little singed, only for the sake of seeing Heckla in a blaze; and we almost flattered ourselves with this hope, since the bishop of Skalholt had informed us

* Three hundred or three hundred and sixty English miles.

by letter, in the night between the 5th and 6th of September, the day before our arrival, flames had proceeded from it ; but now the mountain was more quiet than we wished. We however passed our time very agreeably, from one o'clock in the night till two next day, in visiting the mountain. We were even so happy, that the clouds which covered the greatest part of it dispersed towards evening, and procured us the most extensive prospect imaginable. The mountain is something above five thousand feet high, and separates at the top into three points, of which that in the middle is the highest. The most inconsiderable part of the mountain consists of lava, the rest are ashes, with hard, solid stones thrown from the craters, together with some pumice-stones, of which we found only a small piece, with a little native sulphur. A description of the various kinds of stones that are to be found here, would be too prolix, and partly unintelligible ; and I so much the more willingly omit it, as I hope to satisfy your curiosity, as

I

soon

soon as the collection I made of them arrives in Sweden.

Amongst many other openings, four were peculiarly remarkable ; the first, the lava of which had taken the form of chimney-stacks half broken down ; another, from which water had streamed ; a third, all the stones of which were red as brick ; and lastly, one from which the lava had burst forth in a stream, which was divided at some distance into three arms. I have said before, that we were not so happy to see Heckla throw up fire ; but there were sufficient traces of its burning inwardly ; for on the upper half of it, covered over with four or five inches deep of snow, we frequently observed spots without any snow ; and on the highest point, where Fahrenheit's thermometer was at 24° in the air, it rose to 153° when it was set down on the ground ; and in some little holes it was so hot that we could no longer observe the heat with a small pocket thermometer. It is not known whether, since the year 1693, Heckla has been burning till 1766, when it began to throw up

flames on the first of April, and was burning for a long while, and destroyed the country many miles around. Last December some flames likewise proceeded from it ; and the people in the neighbourhood believe it will begin to burn again very soon, as they pretend to have observed, that the rivers thereabouts are drying up. It is believed that this proceeds from the mountain's attracting the water, and is considered as a certain sign of an impending eruption. Besides this, the mountains of Myvatn and Kattlegia are known in this century, on account of the violent inflammations of the former, between the years 1730 and 1740, and the latter in 1756.

But permit me, Sir, to omit a farther account of the volcano at this time*, in order to speak of another effect of the fire, which is much finer, and as wonderful as the first, and so must be the more remarkable, as there is not in

* Dr. Troil treats more at large of the Icelandic volcanoes in his 18th and 19th letters; and in the 20th, he speaks more particularly of mount Heckla.

any part of the known world any thing which resembles it ; I mean the hot springs of water which abound in Iceland†.

They have different degrees of warmth, and are on that account divided by the inhabitants themselves into *laugar*, warm baths, and *huerer*, or jets d'eaux; the first are found in several other parts of Europe, though I do not believe that they are even employed to the same purposes in any other place: that is to say, the inhabitants do not bathe in them here merely for their health, but they are likewise the occasion for a scene of gallantry. Poverty prevents here the lover from making presents to his fair one, and nature presents no flowers of which elsewhere garlands are made: it is therefore customary, that instead of all this, the swain perfectly cleanses one of these baths, which is afterwards honoured with the visits of his bride. The other kind of springs mentioned above deserves more attention. I

† The 21st letter treats more fully of the hot springs in Iceland,

have seen a great number of them ; but will only say something of three of the most remarkable. Near Laugervatn, a small lake of about a mile in circumference, which is about two days journey distant from Heckla, I saw the first hot jet d'eau ; and I must confess that it was one of the most beautiful sights I ever beheld. The morning was uncommonly clear, and the sun had already begun to gild the tops of the neighbouring mountains ; it was so perfect a calm, that the lake on which some swans were swimming was as smooth as a looking-glass ; and round about it arose, in eight different places, the steam of the hot springs, which lost itself high in the air.

Water was spouting from all these springs ; but one in particular continually threw up a column from 18 to 24 feet high, and from 6 to 8 feet diameter the water was extremely hot. A piece of mutton, and some salmon trouts, we boiled in it ; as likewise a ptarmigan, which was almost boiled to pieces in six minutes, and tasted excellently. I wish it was in my power,
Sir,

Sir, to give you such a description of this place as it deserves ; but I fear mine would always remain inferior in point of expression. So much is certain, at least, nature never drew from any one a more cheerful homage to her great Creator than I here paid him.

At Reikum was another spout of the same sort ; the water of which, I was assured, rose to 60 or 70 feet perpendicular height some years ago ; but a fall of earth having almost covered the whole opening, it now only spouted between 54 and 60 feet sideways. We found a great many petrefied leaves in this place, as likewise some native sulphur, of which too the water had a much stronger taste than any where else.

I have reserved the most remarkable water-spout for the end ; the description of which will appear as incredible to you as it did to me, could I not assure you that it is all perfectly true, as I would not aver any thing but what I have seen myself. At Geyser, not far from Skallholt, one of the episcopal sees in Iceland, a most extraordinary

dinary large jet d'eau is to be seen, with which the celebrated water-works at Marley and St. Cloud, and at Gaf-fel, and Herrenhausen, near Hanover, can hardly be compared. One sees here, within the circumference of half a mile*, forty or fifty boiling springs together, which, I believe, all proceed from one and the same reservoir. In some the water is perfectly clear, in others thick and clayey; in some, where it passes through a fine ochre, it is tinged red as scarlet; and in others, where it flows over a paler clay, it is white as milk.

The water spouts up from all, from some continually, from others only at intervals. The largest spring, which is in the middle, engaged our attention particularly the whole day, which we spent here from six in the morning till seven at night. The aperture through which the water arose, and the depth of which I cannot determine, was nineteen feet in diameter; round the top of it is a basin, which,

* About three English miles.

together with the pipe, has the form of a cauldron ; the margin of the basin is upwards of nine feet one inch higher than the conduit, and its diameter is of fifty-six feet. Here the water does not spout continually, but only by intervals several times a day ; and as I was informed by the people in the neighbourhood, in bad rainy weather, higher than at other times.

On the day that we were there, the water spouted at ten different times, from six in the morning till eleven A.M. each time, to the height of between five and ten fathoms ; till then the water had not risen above the margin of the pipe, but now it began by degrees to fill the upper basin, and at last ran over. The people who were with us told us, that the water would soon spout up much higher than it had till then done, and this appeared very credible to us. To determine its height therefore, with the utmost accuracy, Dr. Lind, who had accompanied us on this voyage in the capacity of an astronomer, set up his quadrant.

Soon

Soon after four o'clock we observed that the earth began to tremble in three different places, as likewise the top of a mountain, which was about three hundred fathoms distant from the mouth of the spring. We also frequently heard a subterraneous noise like the discharge of a cannon; and immediately after a column of water spouted from the opening, which at a great height divided itself into several rays, and according to the observations made with the quadrant, was ninety-two feet high. Our great surprize at this uncommon force of the air and fire was yet increased, when many stones, which we had thrown into the aperture, were thrown up with the spouting water. You can easily conceive, Sir, with how much pleasure we spent the day here; and indeed I am not much surprized, that a people so much inclined to superstition as the Icelanders are, imagine this to be the entrance of hell; for this reason they seldom pass one of these openings without spitting into it; and, as they say, *uti fandens mun*, into the devil's mouth.

But

But I think it is time to finish my long letter, and I will only try your patience with one thing more, which likewise deserves to be better known. Natural historians always observed those large remarkable pillars, which the hand of nature has prepared in Iceland, and in some other places, with the greatest attention. The Giant's Causeway has, till now, been considered as the largest and most regular assemblage of these columns; but we have discovered one on our expedition through the western islands of Scotland, which infinitely surpasses it. The whole island of Staffa* consists almost entirely of these pillars, which are as regular as can be imagined; they seem to be of the same substance as the Irish ones, and have from three to seven sides; each pillar is surrounded by others, that join so closely

* See the account of Staffa, by Joseph Banks, Esq. inserted in Pennant's Tour in Scotland, and Voyage to the Hebrides, 1772, page 299, 309, and the fine representations of these basalts, executed after the accurate drawings executed by Mr. John Frederick Miller, employed by Mr. Banks, and communicated by the last mentioned gentleman, for the adorning of Mr. Pennant's Scots Tour.

to it, as to have a very small space between them, which is frequently filled up with a crySTALLIZED incrustation. In most places the pillars are perpendicular; in others they are a little inclined, and yet in others they have the configuration of the timber-work in the inside of a ship. The highest pillar was 55 feet one inch long; and each joint, from one to two feet. There is a cavern here which consists entirely of these pillars; it is 367 feet long; 53,7 broad, and 117,6 high. There are three fathoms of water in it, so that it is easy to enter into it with a boat.

It is difficult to determine the question, how these pillars have been formed; but it is more than probable, nay almost certain, that they are the remains of an antient volcano, many indisputable tracts of which are found in many parts of Scotland. You must not in this place apply to me the story Helvetius tells of a clergyman and a fine lady, who together observed the spots in the moon, which the former took for church steeples, and the latter for

for a pair of happy lovers. I know that we frequently imagine to have really found what we most think of, or most wish for; but I sincerely assure you, that I do not speak of such fires without the most decisive opinions. I will, however, reserve a further account of these extraordinary productions till my return home, when I flatter myself I shall be able to give you entire satisfaction.

B

L E T.

L E T T E R II.

To the Royal Librarian Mr. GJÓRWELL.

Of Iceland in general.

Utrecht, Jan. 22, 1773.

S I R,

YOU are, no doubt, informed of the voyage Mr. Banks and Dr. Solander undertook last summer to Iceland, as well as of my having accompanied these gentlemen on that expedition. I need not tell you what reasons determined me to become one of their company. You can easily conceive how many different circumstances might have persuaded a curious Swede to visit a country remarkable in so many respects ; I am perfectly satisfied with my voyage, and can easily convince you of it, by communicating to you some little account of what principally attracted our attention during its course.

We

We set sail from London on the 12th of July last in a ship, for which one hundred pounds sterling were paid every month. Besides Mr. Banks, Dr. Solander, and myself, we had on board an astronomer*, a lieutenant of the navy (a very worthy man, his name is Gore, and deserves to be mentioned, as he is, as far as we know, the first who has sailed three times round the world†) together with a lieutenant, three draughtsmen, and two writers, who, with the seamen and servants, made about forty people.

We first landed on the Isle of Wight, which is a little paradise, where we spent two days. Nature seems to have spared none of her favours in embellishing it; and I know no place in it which does not present a pleasing

* Dr. James Lind of Edinburgh, who is well known by many memoirs inserted in the Philosophical Transactions, and other ingenious publications.

† Captain Dampier did it a long time before Mr. Gore, viz. Cowley and Dampier, 1683, 1684; Dampier and Funnel, 1689, 1691; Woodes, Rogers, and Dampier, 1708, 1711. If lieutenant Gore and captain Charles Clerk return safe home from the voyage they are now engaged in, they both will have sailed four times round the world.

view to the observer. The inhabitants resemble their island ; they live in a little community among themselves ; they are not very rich, neither have they any beggars. They are generally cheerful, cleanly, and obliging ; and there are but few instances among them of any one marrying a person who did not at that time reside or afterwards settle on the island.

From thence we sailed to Plymouth, where we saw the docks, magazines, and every thing belonging to them worthy of notice, and then proceeded towards St. George's channel.

We had intended to land on the Isle of Man, as it is one of the few places where the Runic characters have been brought by the Danes, and the only one, except the north, where some of our old Runic stones are found ; but at sea we cannot always act according to our pleasure : the wind obliged us to leave the Isle of Man on our right, and to continue our course to the western islands of Scotland.

It is exceedingly pleasant to sail among these islands, though not very safe, without a good wind and expert pilots:
for

for in the first case you must depend upon the ebb and flood; and in the second you are in continual danger on account of the great number of rocks.

The nature of the country is such, that I do not wonder at its having given birth to a Fingal, and an Ossian. It is not the only place where we have seen heroes produced among the mountains; and what can be more calculated to form a poet, than wild romantic and enchanting scenes of nature, which are here so pleasingly blended.

It would be tedious to enumerate all the isles we have visited. The most remarkable are Oransay and Columskill, on account of their antiquities; Scarba, for its known water-drain, (Vatta-drag); and Staffa, on account of its natural pillars, which hitherto have been little known, and surpass whatever has been observed before of the kind.

You know, Sir, that the inhabitants of these isles, as well as in the Highlands of Scotland, have a language of their own, which they call Erse, and which is a remnant of the Celtic. In

this language Ossian wrote his admirable poems ; and though the inhabitants cannot at present produce any thing comparable to them, yet I hope, on my return home, to give you proofs of their being able to write both with elegance and sentimental feelings. As it is very extraordinary that this language should have preserved itself here so long*, it will perhaps not be disagreeable to you to be

* The very little connection which the antient inhabitants of the Scots Highlands and of the Hebrides had with other nations (especially before the Union, which has in every respect been beneficial to them) is the true cause that the Erse language has so long been preserved among them. Besides these reasons there is another, which accounts almost for them all ; the poverty of the soil and inclemency of climate admit of very little cultivation, so that these parts have very few natural productions which might tempt foreigners to visit them : some few gifts of nature are, no doubt, lodged in the bosom of the Scots hills ; but hitherto indolence and want of industry in the natives have neglected these riches : within a few years only it is that commerce has begun to raise its head, which alone induces other nations to frequent this or any country. It is therefore not so very extraordinary, that in a mountainous country the remains of ancient nations should be found, who long preserve their language. In the Caucasus are still existing the posterity of several nations who crossed these mountains in their attempt to conquer Asia and Europe ; and within a small compass, more than five or six different languages are spoken.

more particularly acquainted of the limits within which it is confined. I will readily sketch them out to you, being able to do it with so much the more certainty, having received my information from Mr. Macpherson, the only man in England who has particularly studied this language.

It begins to be spoken on the eastern side at Nairn, and extends from thence through the whole country, and all the western isles. In the north its limits are at Cathness, where Erse is only spoken in four parishes out of ten; in the other six, better English is spoken than in any other part of Scotland. There is in Ireland another dialect of it, as well as in Wales and Britany; however, they are not so different, but a man born in either of these provinces, may make himself understood in the others. Had I been acquainted with the language of the Dalikarlans, I should have had an opportunity of examining how far that similarity is founded which, as it appeared to my ear, subsists between these two languages.

The country abounds with northern antiquities, such as castles, strongholds, burying-places, and monuments, (Bautasteinar); and the people, who are obliging and extremely hospitable, have a number of customs resembling those observed by our country-people, such as the celebration of the first of May*, and many others.

We now left these islands, and continuing our voyage arrived at last, on the 28th of August, at Iceland, where we cast anchor at Bessæstedi, formerly the dwelling-place of the famous Sturluson. We seemed here to be in another world; instead of the fine prospects with which we had fed our eyes, we now only saw the horrid remains of many

* It is called in Sweden *war Fruday; le jour de notre Dame*, our Lady's Day. The witches are supposed to take, in the night preceding that day, their flight to Blakulla, a famous mountain; but it was formerly believed in Germany, that the witches travelled to the Bloxberg or Brocken, a high mountain contiguous to the Hartz forest. In Sweden the spring comes on about this time, and of consequence the hard labour of ploughing, mowing, and reaping follow one another from that time, and require the best exertion of the strength of the husbandmen, to which they prepare themselves on this day by frequent libations of their strong ale, and they usually say, *Maste man dricka marg i benen*; You must drink marrow in your bones.

devastations. Imagine to yourself a country, which from one end to the other presents to your view only barren mountains, whose summits are covered with eternal snow, and between them fields divided by vitrified cliffs, whose high and sharp points seem to vie with each other, to deprive you of the sight of a little grass which scantily springs up among them. These same dreary rocks likewise conceal the few scattered habitations of the natives; and no where a single tree appears, which might afford shelter to friendship and innocence. I suppose, Sir, this will not inspire you with any great inclination of becoming an inhabitant of Iceland; and indeed at first sight of such a country one is tempted to believe that it is impossible it should be inhabited by any human creature, if one did not see the sea, near the shores, every where covered with boats.

Though there is scarcely any country so little favoured by nature, and where she appears throughout in so dreadful a form, yet Iceland contains about 60,000 people, who cannot properly

perly be called unhappy, though they are unacquainted with what in other places constitutes happiness. I spent there above six weeks with the greatest pleasure, partly in studying one of the most extraordinary situations of nature, and partly in collecting information from the natives, concerning their language, manners, &c. &c. As to the former, I have treated of it in a letter to professor Bergman, which I doubt not he will communicate to you with pleasure, if you desire it. Of the latter I will here mention some particulars.

You know, Sir, that Iceland first began to be cultivated in the eleventh century by a Norwegian colony, among which were many Swedes. They remained perfectly free in this corner of the world for a long time ; but were, however, at last obliged to submit to the Norwegian kings, and afterwards became subject, together with Norway, to the kings of Denmark. They were at first governed by an admiral, who was sent thither every year to make the necessary regulations ;

lations; but that mode has been changed many years, and a governor* appointed, who constantly resides in the country. This post is, at present, occupied by Mr. Larr Thodal, who has formerly been Danish plenipotentiary in the commission for settling the limits between Sweden and Norway, and has spent several years at Stockholm.

The Icelanders are of a good honest disposition; but they are, at the same time, so serious and sullen, that I hardly remember to have seen any one of them laugh: they are by no means so strong as might be supposed, and much less handsome. Their chief amusement, in their leisure hours, is to recount to one another the history of former times; so that to this day you do not meet with an Icelanders who is not well acquainted with the history of his own country: they also play at cards.

Their houses are built of lava, thatched with turf, and so small, that you find hardly room to turn yourself in them. They have no floors; and

* Stiftsamtmann.

their windows, instead of glafs, are composed of thin membranes of certain animals. They make no use of chimneys, as they never light a fire, except to dress their victuals, when they only lay the turf on the ground. You will not therefore think it strange, when I inform you, that we saw no houses, except shops and warehouses; and on our journey to Heckla we were obliged to take up our lodgings in the churches.

Their food principally consists of dried fish, sour butter, which they consider as a great dainty, milk mixed with water and whey, and a little meat. They receive so little bread from the Danish company, that there is hardly any peasant who eats it above three or four months in the year. They likewise boil groats, of a kind of moss (*Lichen Islandicus*) which has an agreeable taste. The principal occupation of the men is fishing, which they follow both winter and summer. The women take care of the cattle, knit stockings, &c. They likewise dress, gut, and dry the fishes brought home

home by the men, and otherwise assist in preparing this staple commodity of the country.

Besides this, the company who yearly send fifteen or twenty ships hither, and who possess a monopoly which is very burthensome to the country, export from hence some meat, edder-down, and some falcons, which are sold in the country for seven, ten, and fifteen rix-dollars a-piece. Money is very rare, which is the reason that all the trade is carried on by fishes and ells of coarse unshorn cloth, called here Wadmal; one ell of wadmal is worth two fishes; and forty-eight fishes are worth a rix-dollar in specie. With gold they were better acquainted at our departure, than on our arrival.

They are well provided with cattle, which are generally without horns: they have likewise sheep, and very good horses; both the last are the whole winter in the fields: dogs and cats they have in abundance. Of wild and undomesticated animals they have only rats and foxes, and
some

some bears *, which come every year from Greenland with the floating ice: these, however, are killed as soon as they appear, partly on account of the reward of ten dollars, which the king pays for every bear, and partly to prevent them from destroying their cattle. The present governor has introduced rein-deer into the island; but out of thirteen, ten died on their passage, the other three are alive with their young.

It is extraordinary that no wood grows successfully in Iceland; nay, there is scarcely a single tree to be found on the whole island, though there are certain proofs of wood having formerly grown there in great abundance. Corn cannot be cultivated here to any advantage; though I have met with cabbages, parsley, turnips, pease, &c. &c. in five or six gardens, which were the only ones in the whole island.

* The bears here mentioned are the white polar or arctic carnivorous bears, absolutely forming a species widely distinct from our brown and black bears; though the celebrated Linneus only suspected them to be a new species, not having seen and examined any of these animals.

I must now beg leave to add a few words about the Icelandic literature. Four or five centuries ago the Icelanders were celebrated on account of their poetry and knowledge in history. I could name many of their poets, who celebrated in songs the warlike deeds of the northern kings; and the famous Snorre Sturleson is the man to whom even the Swedes are indebted for the first illustration of their history. We for this reason set so high a value upon the antient Icelandic records and writings, that they have almost all been drawn out of the country: so exceedingly scarce they are become, that, notwithstanding the pains I took during the whole time of my stay there, I got a sight of only four or five Icelandic manuscripts. In the inland parts of the country, our old language has been preserved almost quite pure; but on the coasts, where the natives have an intercourse with the Danish merchants, it has been somewhat altered. Some speak the Danish language very well; but those who did not, could sooner make themselves intelligible

telligible to us Swedes, than to the Danes. We likewise found three or four Runic inscriptions, but they were all modern, and consequently of no value. I have said before that the Icelanders took pleasure in listening to their old traditional sayings and stories; and this is almost the only thing that remains among them of the spirit of their ancestors; for they have at present but few poets; and their clergy know little besides some Latin, which they pick up in the schools established in the episcopal sees at Skallholt and Hoolum. Some of them, however, have studied at the university of Copenhagen; and I became acquainted with three men of great learning among them, who were particularly well versed in the northern antiquities. One of them is the bishop of Skallholt Finnur Jonson, who is compiling an ecclesiastical history of Iceland; the two others are the provost Gunnar Paulson, and Halfdan Ginarson, rector at Hoolum.

That there is a printing-office in Iceland cannot be unknown, as we are acquainted with the rare editions of
 Olof

Olof Tryggvassons, Landnama, Greenland, and Christendoms Sagas, or Traditions, printed at Skallholt; but I did not expect to find the art of printing so antient here, as it was represented to be. A Swede, whose name was John Mathieson, brought hither the first printing-press, between the years 1520 and 1530; and published in the year 1531 the *Breviarium Nidarosense*. I have collected as many Icelandic books as I have been able to discover; among the rarest is the Icelandic bible, printed in folio at Hoolum in the year 1584. I hope likewise, that fifteen (till now unknown) traditional histories or sagas will be no unwelcome acquisition.

You may judge, Sir, how agreeably I spent my time here in these occupations, which I applied to with so much the more pleasure, as they all related to objects entirely new: added to which, I was in society with Mr. Banks and Dr. Solander; the latter of whom is a most worthy disciple of our Linnæus, and unites a lively temper to the most excellent heart; and

the former is a young gentleman of an unbounded thirst after knowledge, resolute, and indefatigable in all his pursuits, frank, fond of social conversation, and at the same time a friend of the fine arts and literature : in such company you will confess it was impossible I should have the least reason for regretting the time spent in this voyage.

I had almost flattered myself with the hopes of seeing Mr. Banks and Dr. Solander in Sweden ; but I learn that they will be detained in England for some time. I much fear Dr. Solander will be for ever lost to his native country, as well on account of the universal esteem in which he is held in England, as of his being preferred to a more beneficial place at the British Museum than that which he formerly possessed.

Their voyage to the South Seas will probably make its appearance in April or May next. They have already begun to engrave the collections of animals and plants they have made on their voyage, which will employ them
several

several years, as they must consist, I should apprehend, of near 2000 plates.

It would be writing a natural history were I to attempt to give a proper description of these admirable collections. They have alone above 3000 fishes and other animals preserved in spirits, most of which are new: Linnæus might find among their plants, of which they have several sets, (one of which, I flatter myself, will find its way into Sweden) subjects for a new mantissa.

I propose, when I have seen Holland, to make a little excursion to Germany to see Mr. Michaelis, and soon afterwards return to my native country, where I shall have the honour of assuring you personally of the affectionate regard, &c. &c.

L E T T E R I I I .

T O C H E V A L I E R I H R E .

*On the phsyical Constitution of the
Country.*

Stockholm, June 20, 1773.

S I R,

TH E R E is no duty more agreeable to me, than that of obeying your commands, in transmitting to you some account of Iceland, its antiquities, and what else relates to it. As I have happily had an occasion of seeing the country myself, it may with justice be required of me, that I should willingly communicate to others the informations I have been able to procure ; and it would give me peculiar pleasure if they enabled me satisfactorily to answer those questions which you kindly proposed to me.

Iceland

Iceland is justly reckoned amongst the largest islands in the known world. It is sixty miles in length, and its breadth exceeds forty Swedish miles*.

The most useful among many maps of this country is that which has been made by Messrs. Erickssen and Schooning in the year 1771, though it might be further improved.

Bessstedr, in the southern part of the island, not far from Hafnefiord, lies, according to Horrebow's account of Iceland, in 64 degrees 6 minutes of north latitude, and in 41 degrees of longitude, from the meridian of Stockholm; so that it is almost in the latitude of Hernósand†.

The country does not afford a pleasing prospect to the eye of the traveller, though it presents him with objects worthy of attention in many respects: for besides innumerable ridges of mountains that cross it in several directions, and some of which, on

* About 360 British sea-miles in length, and about 240 in breadth.

† A town in Sweden.

account of their height, are covered with continual ice and snow, you only see barren fields between them, entirely destitute of wood, and covered with lava for the space of many miles. This is certainly as incapable of giving the eye pleasure, as it is unfit for any other use. On the other side, however, it causes the greatest surprize in the attentive spectator, to see so many speaking proofs of the dreadful effects of volcanoes.

Though the coasts are better inhabited, the inland parts of the country do not lie waste and neglected; and one finds every where, sometimes closer together, and sometimes at greater distances, farms with some land belonging to them, which generally consists of meadow-land, and sometimes of hills thick spread with low shrubs and bushes, and which they honour with the appellation of Woods.

In the whole island there are no towns, nor even villages; nothing but single farms are to be seen, some of which, however, consist of several dwelling-

dwelling-houses, destined for the owner of the farm and his tenants (*hiá leygu-mann*) who procure from the proprietor a house and pasture for as many cows, horses, and sheep as they chuse to agree for. On the estates of some peasants who are better circumstanced, there are even sometimes dwellings for labourers (*huusman*) who work for daily hire. All these farms belong either to the king, the church, or the peasants themselves *. I will mark the price of two of these farms, which were sold a little before our arrival, that you may judge of their value. The one farm, whereon ten cows, ten horses, and four hundred sheep might be kept, was sold for one hundred and twenty rix-dollars; and the other, which had sufficient pasture for twelve cows, eighteen heads of young cattle, above a year old, that had not yet calved (*ungnot*), eight oxen, fourteen

* In order to shew at once in what proportion the farms are distributed between the king, the church, and the farmers, I will here annex an abstract taken from the Icelandic Villarium, or Land-book of the year 1695, which came into my possession.

horses, and three hundred sheep, for one hundred and sixty dollars.

In some few places they have small fenced spots near their houses, in which they cultivate cabbage, parsley, spinach, turnips, patientia, potatoes, and some other roots and vegetables, together with flax and hemp. Fruit trees are looked for in vain, which is not to be wondered at, since storms and hurricanes are here very frequent. These have given rise to the name of (*Wedrakista*) Storm-coast, which has been given to some places in Iceland.

They have likewise prevented the growth of fir-trees, and Norway pitch-firs *, which governor Thodal had planted here, whose tops seemed to wither as soon as they were about two feet high, when they then ceased growing.

That wood has formerly grown in Iceland, can be proved from the Sagas or tradition stories of Landnama, Kjalnesinga, Svarfdala, and Egill Skallagrímsönare. It is likewise proved by

* *Pinus picea*, Linn. and *pinus abies*, Linn.

pieces which are frequently dug up in marshes and fens, where not a single bush is to be seen at present. The substance, called by the natives *futurbrand*, is likewise a clear proof of it.

This *futurbrand* is evidently wood, not quite petrified, but indurated, which drops asunder as soon as it comes into the air, but keeps well in water, and never rots: it gives a bright though weak flame, and a great deal of heat, and yields a fourish though not unwholesome smell. The smiths prefer it to sea-coal, because it does not so soon waste the iron. The Icelanders make a powder of it, which they make use of to preserve their cloaths from moths; they likewise apply it externally against the cholick. I have seen tea-cups, plates, &c. in Copenhagen made of *futurbrand*, which takes a fine polish. It is found in many parts of Iceland, generally in the mountains in horizontal beds; sometimes more than one is to be met with, as in the mountain of Lack in Bardestrand, where four strata
of

of futurbrand are found alternately with different kinds of stone.

I have brought a large piece of it with me to Sweden, in which there are evident marks of branches, the circles of the annual growth of the wood, leaves, and bark, in the surrounding clay: and there is some reason to believe, that these trees have been mixed in the thrown-up lava in some eruption of fire or an earthquake.

I am almost inclined to believe that some streams of lava, which at the depth of fifteen feet, according to observations that have been made, can advance twelve thousand Swedish ells, of two feet each, in eight hours, by a declivity of forty-five degrees, have swept away these trees, which seem to have been of a considerable size, and buried them; and this is so much the more probable, as the futurbrand frequently has the appearance of coal. But as I do not know whether this opinion has ever been advanced before, and having had no opportunity of making sufficient observations upon this conjecture, and as there is even some reason
to

to suppose, that a tree would in so violent a fire directly be consumed to ashes, though the contrary may also be possible, when it is in the same instant over-turned, covered, and in a moment smothered ; yet I will not even venture to offer this opinion as a probable conception.

There is still another probable supposition. The trees may have been over-turned by an earthquake, and then covered beneath the hot ashes of a volcano, in the same manner as happened at Herculaneum, and other places, where whole towns have shared the same fate.

That there have been formerly considerable woods in Iceland, can scarcely be doubted ; nay, there are at this time some small spots covered with trees, as at Hallarmstad, Hunsefeld, and Aa, and in several other places. However, there are no fir nor pine-trees ; and the birch-trees now existing never exceed the height of eight or twelve feet, and are not above three or four inches thick, which is partly owing to bad management, partly to the devastations caused by fire or hurricanes,
and

and the Greenland floating ice : the last is the cause that at Stadar-hrauns, Eyry, and Kiolfeld, whole spots of land are seen covered with withered birch-trees. But these being found insufficient to supply the inhabitants with fuel, they likewise make use of turf, fern, juniper, and black crow-berry bushes (*empetrum nigrum*); in other places they burn the bones of cattle killed for butchers meat, and fishes moistened with train-oil; also dried cow-dung that has been the whole winter in the meadow; and last of all floating wood. This floating-wood is obtained in great abundance every year, particularly at Langanas on the north-east coast, at Hornstrand on the north-west side, and every where on the northern coast of the country *. There are several different

* The immense quantity of wood floating down the Mississippi, the St. Lawrence, and other rivers of North America, are probably those which are carried to the northern regions. From the gulph of Mexico a strong current sets across the Atlantic in a south-west to north-east direction, or nearly, and carries many tropical fruits on the coast of Norway, the Ferois, and Iceland; which remarkable circumstance has been noticed by
that

rent kinds of wood among it, the greatest part is Norway pitch-fir *; but besides this, one finds common fir, linder, willow †, cork-wood, and two

that curious observer and delineator of nature George Edwards. But the wood coming down the Mississippi is remarked by Bossu, in his Travels through North America, vol. i. pag. 19. The coast of Greenland is benefited by drift-wood, in the same manner as Iceland. See Crantz's Hist. of Greenland, vol. i. pag. 37. The northern coast of Siberia is often covered with wood in a most astonishing manner. See John George Emlin's Travels through Siberia, vol. ii. pag. 415. Nor is the coast of Kamtschatka destitute of floating-wood. See J. F. Miller's collection of Russian Transactions, vol. iii. pag. 67. The great rivers of Siberia, such as the Lena, Kolyma, Yenisea, and others, carry chiefly in spring many wood trees along with their waters into the ocean, where it is often floating in various directions, set by winds and currents, and checked by the immense masses of ice, till, after many months and years, it is thrown up and left on the coast, for the benefit of the inhabitants of these frigid regions, which are too cold for the growth of trees. Iceland receives its drift-wood by strong westerly and north-westerly gales, varying with southerly winds, which seems to confirm the opinion, that the drift-wood comes from North America: it consists chiefly of *pinus abies*, *picea*, *limbra*, and *larix*, *tilia curopea*, *betula alba*, and *salix caprea*, and some unknown kinds of wood: and according to Catesby's Nat. Hist. of Carolina, great quantities of these enumerated woods are floating down the rivers of Virginia and Carolina; and another part seems to come round the north of Europe from the Siberian rivers.

* *Pinus abies*, Linn. † *Salix caprea*, Linn.

forts of red-wood, which are called *rauda grene* and *staffalejk* in Iceland, and on account of their colour and hardness are employed in various kinds of neat work. It comes most probably from the northern parts of Tartary, and partly from Virginia and Carolina. As to what relates to agriculture, it may be discovered by many passages of the antient Icelandic accounts, that corn formerly grew in Iceland. In later times several trials have been made with it, but they have been attended with little success.

Governor Thodal sowed a little barley in 1772, which grew very briskly; but a short time before it was to be reaped, a violent storm so utterly destroyed it, that only a few grains were found scattered about.

If we consider, besides these strong winds, or rather hurricanes, the frosts which frequently set in during May and June, we shall discover a number of difficulties which check the rise and growth of agriculture in Iceland. If, notwithstanding these obstacles, it
can

can ever be brought to a thriving condition, it must certainly be under the present indefatigable governor, who has the welfare of the country much at heart, and, in conjunction with the government, studies every possible means to promote it.

I consider these violent winds, and the Greenland floating-ice, which every year does great damage to the country, as the chief cause of the diminution of the growth of wood, as well as of the ill success in the late attempts for introducing agriculture.

This ice comes on by degrees, always with an easterly wind, and frequently in such quantities, as to fill up all the gulphs on the north-west side of the island, and even covers the sea as far as the eye can reach; it also sometimes drives to other shores. It generally comes in January, and goes away in March. Sometimes it only reaches the land in April, and, remaining there a long time, does an incredible deal of mischief. It consists partly of mountains of ice (*fiall-jakar*) which are sometimes sixty fathoms high

high above water, and announce their arrival by a great noise, and partly of field-ice (*bellu-is*) of the depth of one or even two fathoms. Of this last some parts soon melt, and other parts remain undissolved many months, often producing very dangerous effects to the country*.

The ice caused so violent a cold in 1753 and 1754, that horses and sheep dropped down dead on account of it, as well as for want of food ; horses

* The immense masses of ice, which are so dreadful, affecting the climate of the country along the northern and northwest coast of Iceland, arrive commonly with a NW or NNW wind from Greenland. Field-ice is of two or three fathoms thickness, and is separated by the winds, and less dreaded than the rock or mountain ice, which is often seen fifty and more feet above water, and is at least nine times the same height below water : these immense masses of ice are frequently left in shoal water, fixed, as it were, to the ground, and in that state remain many months, nay years undissolved, chilling all the ambient part of the atmosphere for many miles round. When many such lofty and bulky ice-masses are floating together, the wood which is often drifting along between them, is so much chafed, and pressed with such violence together, that it takes fire ; which circumstance has occasioned fabulous accounts of the ice being in flames : of the bulk of such ice-masses, see Forster's Observations made during a voyage round the world, pag. 69, 1773 and 1774.

D

were

were observed to feed upon dead cattle, and the sheep eat of each others wool. In the year 1755, towards the end of the month of May, in one night the ice was one inch and five lines thick. In the year 1756, on the 26th of June, snow fell to the depth of a yard, and continued falling through the whole months of July and August. In the year following it froze very hard towards the end of May and the beginning of June in the south part of the island, which occasioned a great scarcity of grafs, infomuch that the inhabitants had little or no fodder the ensuing winter for their cattle: these frosts are generally followed by a famine, many examples of which are to be found in the Icelandic chronicles*.

Besides

* The cold seems to have become more intense in Iceland since the time when these here-before-mentioned fir-trees were growing, and before the ocean was so very much covered with floating ice.

These facts seem to confirm very much the opinion of count Buffon in his *Epoques de la Nature*; in consequence of which he believes that the country towards the poles was formerly more habitable than it is at present: he is of opinion, that the skeletons of elephants found far north in Siberia, are almost irrefragable proofs

Besides these calamities, a number of bears yearly arrive with the ice, which commit great ravages, particularly among the sheep. The Icelanders attempt to destroy these intruders as soon as they get sight of them; and sometimes they assemble together, and drive them back to the ice, with which they often float off again. For want of fire-arms they are obliged to make use of spears on these occasions. The government itself takes every possible method to encourage the natives to destroy these animals, by paying a premium of ten dollars

proofs of the formerly milder temperature of the air; since they could scarcely be found in Siberia in such numbers unless they had existed there. Buffon *Epoques de la Nature*, p. 165, & seq. The Eastern shores of Greenland were formerly inhabited by a colony of Norwegians, and they had there a bishop's see, called Gardar, to which belonged farms, woods, pastures for cattle, granges, and tillage-land. See Crantz's *History of Greenland*, vol. 1. p. 245, which evidently proves the mildness of these now inhospitable regions. Ships sailed formerly to the Eastern coast; whereas for a great number of years past it has been inaccessible, on account of the immense masses of ice found there. Are Frode in *Scheda de Islandia*, Oxon. 1716, cap. 2, p. 10, says, That at the first landing of the Norwegian colonists, Iceland was covered with woods and forests in the space between the shores and mountains.

for every bear that is killed, and by purchasing the skin of him who killed it. These skins are a prerogative of the king, and are not allowed to be sold to any other person.

It is as absurd to suppose that this floating ice consists principally of salt-petre, as that it might be employed in making gun-powder; and yet there are some persons who pretend to support this opinion, but they are certainly undeserving the trouble of refutation.

I must mention two other inconveniences to which Iceland is subject, the *Skrida* and *Snioflodi*: the name of the first imports large pieces of a mountain tumbling down, and destroying the lands and houses which lie at the foot of it. This happened in 1554, when the whole farm of Skidestedr in Vatndal was ruined, and thirteen people buried alive. The other word signifies the effects of a prodigious quantity of snow, which covers the tops of the mountains, rolling down in immense masses, and doing a great deal of damage.

mage. There was an instance of this in the year 1699, during the night, when two farms, in the fyssel of Kiofar, were buried in the snow, with all their inhabitants and cattle*.

The climate is not unwholesome, as the usual heat is not extreme, nor the cold in general very rigorous. However, there are examples of the mercury in Fahrenheit's thermometer falling quite down into the bulb, which is 24 degrees under the freezing point; when at other times it has rose to 104 degrees.

It cannot be determined with any degree of certainty how much the cold has increased or decreased prior to 1749, the year when Horrebow began his observations on the weather; which were afterwards continued by the provost Gudlaug Thorgeirsson to the year 1769: since which period observations have been made by Mr.

* Snioflod, or Snowflood, is a very expressive word for this dreadful accident, which is not uncommon in all alpine countries, especially Switzerland. The Italians call such a rolling down of masses of snow, Lavine; the French, Laivaches; and the Germans, Lauhnen.

Eyolfs Jonson, who was formerly assistant at the Round Tower at Copenhagen, and receives a salary as first observer in Iceland*. His observatory is at Arnarhol near Reykarwick; and, what is remarkable, he makes use of a telescope of his own construction, made of the black Iceland agate, instead of coloured glass.

Lightening and thunder storms are rare, and both in summer and winter seldom happen any where else but in the neighbourhood of volcanoes. Northern lights frequently appear uncommonly strong†. Sometimes a kind of the ignis fatuus is observed (*Snœ-lios* and *brævas-eldur*) which attaches itself to men and beasts.

Amongst other aerial phenomena, the lunar halo (*rosabaugu*) which

* This ingenious gentleman died in 1775, not many months since the writing of this letter.

† The northern lights appear in Iceland in all the different quarters of the compass, especially on the southerly horizon, where a dark segment appears, from whence strong columns of light dart forth. They are most frequently seen in dry weather, though there are instances of their appearance before, during, and after a shower of rain. The lights are often seen tinged with yellow, green, and purple. See Oggert Olaffen's & Bjarne Paulsen's Travels through Iceland, sec. 855.

prognosticates bad weather, likewise deserves a place here, as well as parhelions (*híasolar*) which appear sometimes from one to nine in number*. Fire-balls (called *Viga Knottur*) are likewise observed, and when they are oval are named *Wiigabrandur*; and last of all comets, or *Haleftiernor*, which are often mentioned in their chronicles.

The ebb and flood here, which the Icelanders call *flod* and *fiara*, are perfectly the same as at other places: they are stronger during the new and full moon than at other times, and strongest of all about the equinoxes.

As I am here speaking of the nature of the country, I cannot pass over in silence the earthquakes which often happen, particularly before volcanic eruptions. In September, in the year 1755, fifteen violent shocks were ob-

* The parhelions are observed in Iceland chiefly at the approach of the Greenland ice, when an intense degree of cold is produced, and the frozen vapours fill the air: there are many instances proving, that under such circumstances, the sun never appears without shewing one or several parhelions, and often a rainbow on the opposite side.

served within a few days; and it is not uncommon to see whole farms overturned by them, and large mountains burst asunder, as will be remarked hereafter, in the letter which treats of the conflagrations in Iceland.

In so mountainous a country, where there is no agriculture, and no commerce, except that carried on by bartering of the various commodities on the arrival of the Danish ships, no good roads can be expected: they therefore make use of neither carts nor sledges; and there are many places in which it is both difficult and dangerous even to ride on horseback, which have caused the names of *Ofoerur*, *Hal-savegur*, *Hofdabrecka Illaxlif*, to be given to some roads. Their length is not reckoned by the number of miles, but that of *thingmanna-leid*, that is, as far as a man, who is travelling to a place where justice is administered, can go in one day, which is about three and a half Swedish, or four Icelandic miles*. Formerly houses were

* About twenty-one or twenty English miles.

built in some particular places for the use of travellers, which were called *Thiodbrautar-skaala*; but now the churches are every where made use of for this purpose.

When the Icclander travel to sea-ports to exchange their fish, &c. they have twenty, thirty, and sometimes a greater number of horses with them, which carry a load of 300 or 400 pounds weight each; but they have always some spare horses along with them to relieve those that are fatigued: this cavalcade is called *Lest*; and the man who guides them is called *Lestamadur*: he rides on before, accompanied with a dog, that, by uttering a certain word, drives the strayed or straggling horses into the right road. They never carry any food for their horses, as pasture is plenty every where.

The number of the inhabitants is by no means adequate to the extent of the country. It has been much larger in former times; but besides what is called the *Digerdeath*, and other contagious diseases, among which the plague carried off great numbers from

1402 to 1404, many places have been entirely depopulated by famine. In the years 1707 and 1708, the small-pox destroyed 16,000 persons ; so that the number of inhabitants cannot exceed 60,000.

L E T T E R

L E T T E R I V.

TO CHEVALIER IHRE.

*Of the Arrival of the Norwegians, the
Government, and Laws in Iceland,*

Stockholm, June 13, 1774.

AS I have treated in my former letter of the nature of the country in Iceland, an enquiry how, and when it was first peopled, might not perhaps be disagreeable to you.

We know little or nothing of the first inhabitants of Iceland, who possessed the country when the Norwegians first arrived there. We are informed by some, that they were Christians, who, according to the most probable conjectures, arrived there from England and Ireland, and were called *Papa* by the Norwegians *. They pretend
to

* The ancient Norwegians, who first landed in Iceland, found there inhabitants who were Christians, and were called by the Norwegians *Papas*, which is conjectured to signify priests. This is confirmed by the preface of the *Landnama Bok*, or Book of Colonization,

to affirm with the greatest certainty, that this English colony settled there in the beginning of the fifth century ; but I look upon it as the safest way not to enter at all upon an affair wrapped up in such obscurity. There is notwithstanding reason to suppose that the English and Irish were acquainted with this country under another name

tion, written by various authors, the first of whom was Are Frode, born 1068 ; and he expressly says, in the first chapter of the book, that Iceland was settled by the Norwegians in the time of Alfred king of England, and of Edward his son. The same preface mentions, that Beda speaks of Iceland, under the name of Thyle, more than a hundred years before the arrival of the Norwegians in Iceland ; and that the Norwegians found there Irish books, bells, and crofiers, which proved that these people came from the West. And it is added, that the English books mention an intercourse of navigation between those lands about those times. King Alfred certainly mentions in his translation of Orosius, the utmost land to the NW of Iceland, called Thila ; and that it is known to few on account of its great distance. See Alfred's Orosius, p. 31. The Landnama Bok was published at Copenhagen, 1774, in 4to. The circumstance of the Irish books left in Iceland is likewise mentioned by the same Are Frode, in Ara Multiscii Schedis de Islandia. Oxoniæ, 1716, 8vo. cap. ii. pag. 10. who says, they chose not to live with the Heathens, and for that reason went away, leaving behind Irish books, bells, and crofiers.

long

long before the arrival of the Norwegians; for the celebrated Beda in his time pretty accurately describes it. But I will not dwell upon these ancient inhabitants of Iceland, but proceed to examine how the Norwegians came to settle there. Of this we have several accounts in the Icelandic Sagas*. I shall particularly follow *Landnama Bok*, which treats of the arrival of these new colonists.

Naddoddr, a famous pirate, was driven by the winds on the coast of Iceland, on his return from Norway to the Ferro Gales, in 861, and named the country *Snio-land* (Snow-land) on account of the great quantity of snow with which he saw the mountains covered. He did not remain there long; but however extolled the country so much after his return, that one Gardar Suafarfon, an enterprizing Swede, was encouraged by his account to

* The word Saga signifies the ancient historical monuments in Iceland; some of them are the historical relations, others are fabulous stories in the style of the Arabian Nights. The distinction between them requires a nice critical judgment. As the word occurs often, we once for all explain it here.

go in search of it in 864. He sailed quite round the island, and then called it *Gardarsholmur* (Gardar's Island). He remained the whole winter in Iceland, and in spring returned to Norway, where he described the new-discovered island as a pleasant, well-wooded country. This excited a desire in Floke, another Swede, and the greatest navigator of his time, to undertake a voyage thither. As the compass (in Icelandic *Leitharstein**) was not then known, he took three ravens on board, to employ them on the discovery. By the way he visited his friends at Ferro; and after having sailed farther to the northward, he let fly one of his ravens, which returned to Ferro. Sometime after he dismissed the second, which returned

* The word *Leitharstein* is certainly equivalent to the English word Loadstone, and probably has the same origin. The Anglo Saxon word *Lædan* signifies to lead; and the magnet being the leader of the navigator, it is very evident that the loadstone is the leading stone of the ship. The history of the three ravens is most evidently copied from the history of the deluge in Genesis. However it proves an uncommon sagacity in the navigator, who made use of birds for the first discovery of land.

to the ship again, as he could find no land. The last trial proved more successful, since the third raven took his flight to Iceland; soon after they discovered land, and in a few days really arrived there. Floke stayed here the whole winter with his company; and because he found a great deal of floating ice on the north side, he gave the name of Iceland to the country, which it has ever since retained.

When they returned to Norway in the following spring, Floke and those that had been with him, made a very different description of the country. If on the one side Floke described it as a wretched place, Thorulfr (one of his companions in the voyage) on the other side so highly praised it, that he affirmed butter dropped from every plant, which gained him the nick-name of Thorulfr Smior, or Butter Thorulfr*.

* The expression which Thorulfr made use of in describing the fertility and richness of the country, characterizes the genius and manners of the age he lived in, and is therefore not to be over-looked in this account. These minute strokes paint the character and simplicity of the age, and, when compared with our manners, set them off in the fairest point of view.

After

After what I have related, there are no traces of any voyage to Iceland, till Ingolfr and his friend Leifr undertook one in 874. They found on their arrival that the country had not been misrepresented; and resolved, after having spent the winter on the island, to settle there entirely for the future. Ingolfr returned to Norway, to provide whatever might be necessary to accomplish a new and comfortable establishment in an unfertilized and dreary country; and Leifr in the meanwhile went to assist in the war in England. After an interval of four years, they met again in Iceland, the one bringing with him a considerable number of people, with the necessary tools and implements for making the country habitable; and the other imported his acquired treasures. Since this period many people went there to settle, and in sixty years time the whole island was inhabited; and king Harold, who did not contribute a little towards it by his tyrannical treatment of the petty kings and lords in Normandy, was at last obliged to issue an order,

order, that no one should sail from Norway to Iceland, without paying four ounces of fine silver to the king, in order to put a stop, in some measure, to those continual emigrations which weakened his kingdom.

Though the greatest part of the inhabitants came from Norway, there are however many Danes and Swedes among them. Of the latter I will only mention the following, from that edition of *Landnama Bok*, which was printed at Skallholt. Ingimundur, an earl in the Gothic empire, one of the descendants of Bore, Gore's brother, p. 90; with his friends Jorundr, Ejvindr Sorkver, Asmundr, and Hvatefridleifr; and his slaves Fridmundr, Bodvar, Thorer Refskegg, and Ulfkell, p. 90: Thordur, descended by the father's side in the fifth degree from Ragnar Lodbrock, p. 102: Thordur Knappur, natural son of Biorns of Haga; and Nafar Helge, p. 104: Bruni Hin Hviti, son of Hareks, earl of Upland, p. 104: Thormodur Hin Rami, p. 105: Biorn Rolsson of the blood royal, p. 105:

Helgi Hin Magri, p. 107: Thorir Snepill, a son of Joruns, daughter of the Lagman Thorgnys, p. 117; and Gardar Suafarson. Besides these, Are Frode mentions one of the name of Olaf, who was of the same family as king Harold; another of the name of Hrollangur, brother of Rolfs first duke of Normandy, who drew his origin from the Swedish king Gore, grandfather of Gylfe.

Torfæus mentions one Bodvar, a Swede, who settled in Iceland, and was a descendant of the princess Goja, sister of Gore: Floke, who gave to the island its present name of Iceland, was descended from the same family. Dalin, in his preface to the first volume of his Swedish history, likewise mentions, out of Peringskold and Bjornner, the following: Snobjorn, Bjorn Ostrane, Grim, Orm Wedorm, Bjorn, and Grimkill, with their mother Helga, daughter of Harold, Barder Snefallfas, Barder Wiking, Brimle, Hjelm, Gote, Skolder Svenske, Glammer, Wafur Helge, and Slattubjorn.

As

As often as a new colony arrived there, the principal person in the company appropriated to himself as large a part of the country as he was able to occupy, and gave up as much of it as he thought fit to his companions, whose chief he was, bearing the title of Godi. But in a period when robberies and violence, by sea and land, were considered as valour and merit, peace could not long subsist between the neighbouring leaders. There are every where instances to be met with in the Icelandic Sagas of battles between the new and original settlers. To prevent these conflicts in future, a person was chosen in the year 928, with the title of Laug-faugumadur, and great power and dignity conferred upon him. This man was the speaker in all their public deliberations, pronounced sentence in difficult and intricate cases, decided all disputes, and published new laws after they had been received and approved of by the people at large; but he had no power to make laws without the approbation and consent of the rest.

He therefore assembled the chiefs whenever the circumstances seemed to require it; and after they had deliberated among themselves, he represented the opinion of the majority to the people, whose assent was necessary before it could be considered as a law. His authority among the chiefs and leaders was however inconsiderable, as he was chosen by them, and retained his place no longer than whilst he had the good fortune to preserve their confidence.

Their first form of government was consequently a mixture of aristocracy and democracy: but all the regulations made by it were insufficient to maintain order among so many chiefs, who, though all of the same rank, were differently inclined, and unequal in power. Nothing was therefore more frequent than rapine and violation of the laws. They openly made war against one another, examples of which are to be met with in the Sturlunga Saga, where, it is said, 20 vessels, carrying 1300 men, had a bloody engagement, which

which so weakened the contending parties, that their whole power at last became an easy prey to a few arbitrary and enterprising men, who, as is too generally the case, wantonly abused it, to the oppression of their countrymen, and the disgrace of humanity *.

Notwithstanding all these intestine troubles, they remained entirely free from the Norwegian yoke ; though the kings of that country, since the time of Harold Harfagers, viewed this new and powerful republic with envious eyes, which, though now separated, owed its origin to them ; but at last they experienced that fate, which is almost always inevitable, wherever liberty degenerates into licentiousness, and public spirit into selfish views ; that is, they were obliged to submit to one chief. The greatest part of the inhabitants in 1261, put themselves under the protection of king Hakans, and promised to pay tribute

* The account of the origin of the Icelandic republic is a curious and interesting circumstance for the history of humanity ; the same must be said of the intestine feuds which gave an opportunity to the Norwegian kings to establish their authority over this once free nation.

to him on certain conditions agreed upon between them, and thereſt followed their example in 1264. Afterwards Iceland, together with Norway, became ſubject to the crown of Denmark, which intruſted the care of it to a governor, who commonly went there only once a year to examine every thing, though, according to his inſtructions, he ought to have reſided there. As the country ſuffered incredibly through the abſence of its commanders, it was reſolved a few years ago, that the governor ſhould reſide there continually, and have his ſeat at Beſſeſtedr, one of the royal domains, where old Snorre Sturleſon formerly dwelt. He has under him a bailiff, two laymen, a ſheriff, and twenty-one *ſyſſelmen**. Formerly the country was

* The place of *Amtman* is here tranſlated Bailiff, and is to be taken in the ſenſe in which the French receive the word *Bailif*, i. e. the head of a Bailiwick. The word *Lagmann* ſignifies properly a Lawman; i. e. a perſon who adminiſters juſtice, and might be tranſlated Judge or Juſtice. The *Landvoigt* is the perſon who adminiſters the executive power of juſtice and the criminal law; and he may be compared to a ſheriff. The *Syſſelmen* are the magiſtrates of the ſmaller diſtricts in Iceland (called the *Syſſel*) who not only act as juſtices of the peace, but alſo as receivers

was divided into quarters (*Fiordungar*) each having its own court of justice, of which one was formed of their public assemblies, under the denomination of *Fiordungs-doeme**. But as the public security seemed to require a superior court of judicature, to which the suffering party might appeal; a *Fimtar-doeme* was established soon after the introduction of the Christian religion, which tribunal consisted of the four above-mentioned courts, and some clergymen.

receivers of the land-tax. The governor is called in Iceland *Stifts-amtmann*, which is the same as a bailiff of the episcopal diocese; i. e. the chief magistrate of the island. This place was occupied in 1772 by Mr. Thodal, counsellor of justice, who had been employed in the final adjustment of the limits between Sweden and Norway; his salary amounts to 1500 rix-dollars. Travellers praise his abilities, patriotism, and hospitality. The bailiff at the time of our arrival in Iceland, was Mr. Olaf Stephansson, a native of Iceland, whose parts and abilities we admired, and whose hospitality we experienced: his salary is 400 rix-dollars; and the same appointment is given to the sheriff (*Landvoegt*) Mr. Skule Magnusen, who is said to deserve well of his country by his patriotism and eminent services.

* The words *Fiordungs-doeme* and *Fimtar-doeme* are still in part preserved in the language. For *Dooms-day* is the day of judgment, from the Gothic word *Doem*, to judge, with which the English word *Doom* corresponds.

At present all causes are first decided at the *Hærads-thing*, or county court, from which the parties concerned may appeal to the *Al-thing*, or common court of justice, which is kept every year on the 8th of July at Thingvalla. Here there are two courts, the one before which the cause in appeal is first brought, and consists entirely of *lagmen**; the other to which recourse may be had for a new hearing the following year, and more accurate examination; and this is composed of the governor, who presides, and twelve assessors, who are the most respectable men in the country, mostly *lagmen* and *sysselmenn*. From this court the parties may again appeal to the supreme court of judicature at Copenhagen, which is final.

The Norwegians, on their first arrival in Iceland, made their own laws; but these proving insufficient, when the number of people increased, Ulflotr undertook, in the year 987, a voyage to Norway, and composed an ac-

* At the same time and at the same place the spiritual court called *Presta-stefna* is held, wherein the governor and bishop preside: the priests are the assessors.

curate code of laws from the regulations established there. He made use of the *Gulathing* law on this occasion, and returned to his native country after an absence of three years.

In 1118, the *Gragas*, a famous ancient code of laws, was received there; and in 1280, that called the *Fonsbok* *, according to which sentence is still pronounced in some cases; but at present most matters are decided after the Danish law, and some more recent regulations.

* The *Fonsbok* was received in 1272, according to an Icelandic Chronicle, published by Langebeck in the second volume of the *Scriptores Hist. Dan.*

LETTER V.

TO CHEVALIER IHRE,

*Concerning Ecclesiastical Affairs in Ice-
land.*

Stockholm, June 22, 1772.

IT is known from Landnama Bok, and the Shedæ of Are, that the Norwegians found some traces of Christianity on their arrival in Iceland. There were also some few Christians among these new colonists, who, however, soon apostatized to the heathen religion, so that it became general there. It is not known whether any attempts had been made to introduce the Christian religion before the year 981, when a certain bishop Frie-dric arrived there from Saxony, and was obliged to return, after a stay of five years, without having made any great progress.

However, a church was built in 984,
by Thorvard Bodvarson, and some
persons

persons received baptism; but others, though they had no objection to the Christian doctrine, could not be prevailed upon to suffer themselves to be baptized, as they pretended it would be indecent to go naked into the water like little boys to receive baptism, which, according to the custom of those times, could only be done by submersion. Some, however, to shew their detestation of paganism, suffered themselves to be signed with the cross, which they called *Primsigning*. These were not considered either as Christians or Heathens; however, they were allowed to eat with the former, and to be buried close to the church-yard.

Olof Tryggvasson afterwards sent them Stefr Thorgilsson, and after him his chaplain Thangbrand, a German by birth; but they were both received with stones and abusive language, as they attempted to convert them, which happened to be at the very spot where the common court of justice was held: nor were they spared by the poets of the country, who, being bribed for the purpose, poured forth

forth in their poetical productions the keenest invectives and satire upon these champions of the Christian religion.

However, the Icelanders obtained some knowledge of the Christian doctrine, which by degrees operated upon their minds. Some of them refused to contribute any more towards the idolatrous sacrifices, and wished to enjoy more circumstantial and certain instruction in the Christian religion; so that on the arrival of Gissur and Hyalti in the year 1000, the whole country was converted without bloodshed, though not without opposition. They also obtained a *jus canonicum* from bishop Grimkell, drawn up by himself, which was as valid as a law till 1123, when it was again revised by bishops Thorlak and Ketill†.

After this time monks and convents abounded in the country. Many monks of the order of St. Benedict and St. Austin settled there, and the people paid a tribute to the Roman see,

* See *Kristnis Saga*, printed at Copenhagen, 1776, in 8vo. p. 57.

† The canon law was printed at Copenhagen, 1776, in 8vo.

as well as other European nations, which consisted in one *nagli*, ten of which were equal to one ell of two feet*.

That Rome did not lose sight of Iceland, though ever so distant, can be proved by the bishop of Skallholt, Arne Therlakson, keeping his own agent, Sighvatr Lande, canon of Drontheim, at the second council of Lyons, which was convened by Gregory I. in the year 1274; and that the Icelanders did not yield in zeal to their fellow Christians, appears by the willingness with which they contributed both men and money to the crusades, which were then in fashion.

Amongst other saints, the bishop of Hoolum, John Ogmundsson, and the bishop of Skallholt, Thorlax Thorhallsson, were worshipped: the last died in 1193, and though he was not canonized by any pope, yet he found

* The value of all things is settled in Iceland by ells of *wadmal*, which is a coarse woollen stuff of their own manufacturing: the see of Rome taxed every man in Iceland as high as the value of ten ells of *wadmal*.

worshippers in Iceland*, Denmark, Norway, England, Scotland, the Orkneys, the Ferro islands, and in Greenland, and even had a church dedicated to him in Constantinople. His Saga is full of miracles, said to have been wrought by him. It was unanimously agreed, that the 10th of January, the day on which he died, and the third of July, when he was elected bishop, should both be annually celebrated. His body was taken out of the grave on the 13th of August, 1198, and put into a coffin plated with gold and silver; and it was resolved to keep this day also as a festival. The protestant bishop Gissur Einarsson, afterwards, from a mistaken zeal, caused the precious ornaments with which the box was adorned to be broken off, and had it covered with brass gilt, which is still preserved in

* Bishop Finnson in his Ecclesiastical History mentions, vol. i. p. 298, note b. That bishop Thorlax had been likewise worshipped as a saint in Sweden, but there are no vestiges of this found in the old Swedish Calendaria. The tenth of January is consecrated to Paulus Eremita, and August the thirteenth to Hippolitus and Locius Martii.

the church of Skallholt, as a piece of antiquity. In the year 1715, bishop John Widalin ordered the pretended relique to be buried, and only a bit of his skull is shewn, which, however, if closely examined, will be found to be neither more nor less than a piece of cocoa-shell. Arcimboldus, so famous in the north for his sale of indulgences, was much too attentive to his interest to have neglected Iceland. In 1517, he had his own agent there, who was, however, more coldly received by bishop Stephen Jonsson than he expected.

The Icelanders first received their own bishops in the year 1057 at Skallholt, and at Holum in 1107. They were originally under the jurisdiction of the archbishop of Bremen and Ham-borough; but in the year 1103 or 4, they became subordinate to Azerus*, first archbishop of Lund in Scania, and in 1152 to the bishop of Drontheim. The Icelanders preserve the memory of their prelates both in their

* In the Icelandic annals he is commonly called *Aussur*.

annual registers, and in their Sagas, which particularly deserve attention, since the actions of many worthy men are found recorded therein. I shall mention the deplorable end of one of their bishops, John Jerechini *, by birth a Dane, who was provost and electus of Westeras, and was appointed archbishop of Upsala, by king Ericus Pomeranus. In this exalted situation he behaved so ill, that he was obliged to fly to Denmark in 1419; from whence, according to the account of the Icelandic registers, he made the best of his way to England, and from thence took his passage for Iceland where he did not arrive till the year 1430. He was received by the inhabitants with open arms, and appointed to the see of Skallholt, which had been vacant eleven years. Here he discovered so much pride and selfishness, that some of the principal persons in the country entered into a conspiracy, and when he was celebrating mass in

* The Icelandic annals call him Jon Geirrecksson.
the

the cathedral church, on the thirteenth of August 1433, in commemoration of St. Thorlak, they took him by force from the altar, stripped him of all his episcopal ornaments, and putting him into a sack, with a large stone round his neck, threw him into the river Bruar, which flows past Skallholt, from whence his body was afterwards drawn, and buried in the cathedral church*.

King Christian III. began to introduce the Lutheran religion in the year 1540: but the zeal with which the bishops (who were then very powerful) opposed him, prevented him from succeeding till the year 1551.

Since that period, the church of Iceland has enjoyed a happy tranquillity, every seed of discord being suppressed in its rise, though some attempts were made to disseminate the evil.

Iceland is divided into 189 parishes, of which 127 belong to the see of Skallholt, and 62 to that of Hoolum.

* This account will serve to correct what is erroneous in Rhyzelii *Episcoposopia*, where the typographical faults in Peringsköld's *Monumenta Uplandica*, vol. I. p. 155, have been copied. Vide Finn. *Hist. Eccl. Islan.* vol. II. p. 471.

All the ministers are native Icelanders, and receive a yearly salary of 400 or 500 rix-dollars from the king, exclusive of what they have from their congregation.

LET-

L E T T E R VI.

To CHEVALIER IHRE.

*Of the Character and Manner of Life
of the Icelanders.*

Stockholm, Sept. 1, 1774.

IN a former letter I treated of the arrival of the Norwegians in Iceland, of their first form of government, and the changes they experienced through their own mismanagement and the vicissitudes of time: give me leave, Sir, to draw your attention to their character and way of life.

In like manner as their ancestors only lived by war, piracy, the chase, and agriculture, so our new Icelandic colonists were strangers to any fame but that acquired by the strength of their arm, and knew no exercises but such as a hardened body was able to support.

To go to war, to plunder, burn and destroy, and surmount every obstacle which opposed their designs, they deemed the surest path to immortality; even their games gave them an opportunity of exercising both their strength and agility of body.

Glimu-list, or the art of wrestling, was general among them; though it is mentioned in their old histories, that their heroes sometimes made use of an artifice which was called *Laufe-tók*, and is the same as what we call tripping up one's heels. *Skylmest*, or the art of fencing, was still more common; for though they treated one another pretty roughly on these occasions, yet those rules of art were wanting which a weaker arm may at present apply to his advantage upon occasion.

The *manjasnadur* was held in the highest esteem: a man, dextrous in that exercise, was held in the utmost veneration by them, and was celebrated even in their songs. This was a kind of single combat, to which a man might challenge any one who was de-

I

furious

firous to be recorded in the annals of fame. Life or death was alike indifferent to these gladiators; and it was deemed a noble art to understand well how to sharpen the instruments of death, as may be seen by *Rigsthulu*.

The situation in which the Icelanders were, in regard to the kings of Norway, who always kept a watchful eye over them, and sought every opportunity to subjugate them, obliged them to have recourse to other states for a knowledge in government and literature. For this purpose, they often sailed to Norway, Denmark, Sweden, England, and Scotland. The travellers, at their return, were obliged to give an account to their chiefs of the state of those kingdoms through which they passed. For this reason history, and what related to science, was held in high repute, as long as the republican form of government lasted; and the great number of Sagas and histories which are to be met with in the country, if not all equally important, shew at least the desire they had of being instructed.

F 3 During

During this time Greenland was discovered by an Icelander, Eyrek Rauda, in 932; and America in 1001, by Bidrn Herjulfson and Leif Erichsson.

To secure themselves, therefore, against their powerful neighbours, they were obliged to enlarge their historical knowledge; they likewise took great pains in studying perfectly their own laws, for the maintenance and protection of their internal security. Thus Iceland, at a time when ignorance and obscurity pervaded the rest of Europe, was enabled to produce a considerable number of poets and historians. When the Christian religion was introduced there, more were found conversant in the law, than could have been expected, considering the extent of the country, and the number of its inhabitants. Fishing was followed among them; but they devoted their attention considerably more to agriculture*, which has since entirely ceased.

* Hans Finssen, in his letter on the feasibility of agriculture in Iceland, Copenhag. 1772, 8vo, demonstrates this by a written document during the time of Snorre Sturleson, pag. 64, which likewise appears from Landnama Bok, chap. 21.

Two things have principally contributed towards producing a great change both in their character and way of life, viz. the progress of the Christian religion under Olof Tryggwason, and the loss of their liberty under king Harold. For if religion, on one side, commanded them to desist from their ravages and warlike expeditions; the secular power, on the other, deprived them of the necessary forces for the execution of them; since this time, we find no farther traces of their heroic deeds, except those which are preserved in their histories. Our present Icelanders give the preference to fishing, and the care of their cattle, to war.

The Icelanders are middle-sized and well made, though not very strong; and the women are in general ill-featured. The men have left off the custom of wearing beards long ago, though you find them represented with them in Eggert Olafsen's travels through Iceland; a drawing which, perhaps, may represent an inhabitant of Sond-
F 4 moer,

moer, in Norway, but by no means an Icclander*.

Vices are indeed much less common among them than in other parts, where riches and luxury have corrupted the morals of the people. Theft is seldom heard of; nor are they inclined to incontinence, though there are examples of persons having been punished more than once on that account.

Though their poverty disables them from imitating the hospitality of their ancestors in all respects, yet the desire of doing it still exists: they cheerfully give away the little they have to spare, and express the utmost joy and satisfaction if you are pleased with their gift. When they want to shew

* This, however, is subject to some exceptions: for the inhabitants of Omund Fiorden, and some families on the north side of the island, still wear beards; and in Fnioskadul lives a man named Benedict, known on account of his beard. Between 1740 and 1750 it happened, between the icy mountains of Sneefaelds Jokne, that two brethren dividing between themselves the inheritance left them by their father, one of them, called Helge, gave his brother four rix-dollars for the exclusive right of wearing a beard, which right, in their family, was the sole prerogative of their late father.

them-

themselves particularly affectionate, they kiss one another on the mouth on their visits: they do the same to the husband and the wife, the mother and the daughter; they are uncommonly obliging and faithful, and extremely attached to government *. They are very zealous in their religion †, and it must be owned not entirely free from superstition. They have an inexpressible attachment for their native country, and are no where so happy. An Icclander, therefore,

* To prevent smuggling, there is a severe penalty for piloting a strange ship into harbour. When the philosophic travellers made the coast, they were under necessity to force an Icclander to stay on board, and to serve them as a pilot. And though appeased by good treatment and presents, he nevertheless carried the ship to an unsafe place, till the governor granted his leave to bring the ship to a safe anchorage. When the reason of this strange behaviour was asked, the Icclander answered, he would rather suffer himself to be cut in pieces, than to act against the regulations of his king. It is however told, that the inhabitants on the northern coast are not quite so docile, and therefore less obsequious.

† An Icclander never passes a river, or any other dangerous place, without previously taking off his hat, and imploring divine protection; and he is always thankful for the protection of God, when he has passed the danger in security.

rarely

rarely settles in Copenhagen, though ever so advantageous conditions should be offered him *.

* It seems that Providence wisely instilled into the human heart the love of that soil whereon a man is born, and probably with a view that those places, which are not favoured by nature with her choicest blessings, may not be left without inhabitants. It may be affirmed with some degree of certainty, that the love of ones native place increases in an inverse ratio of its having received favours from nature. A Frenchman seldom or never feels that longing desire for his home, which all Swedes are sensible of. A peasant of Scania (a rich country in a mild climate) eats his hasty-pudding (the favourite dish in Scania) with equal pleasure and enjoyment in whatever place it be; but a native of Elfredahl and Særna (places ill-favoured by nature) thinks his bread made of flour, mixed with the bark of trees in his own country, more preferable to the best dishes he eats in the low country. The chiefest wish of a Switzer is to die in his own country. When a Switzer in the French army sung a certain song to his countrymen in the last war, there arose in the breasts of all that heard him such a disease-like longing for their native country, that it became absolutely necessary to the French generals to give the strictest injunctions, that this song should never be heard again in the camp. This will appear incredible to those who are acquainted with no other happiness than that which is produced by the enjoyment of luxury, affluence, and voluptuousness. It always recalls to the memory that fine passage in Seneca: "Ulysses ad Ithacæ
" suæ faxa sic properat, quemadmodum Agamemnon
" ad Myvenarem nobiles muros; nemo enim patriam
" amat, quia magna, sed quia sua."

On

On the other hand, one cannot ascribe any great industry to them; they work on in the manner they are once used to, without thinking of useful improvements. Perhaps this defect lies more with the government, which being unacquainted with the nature of the country, did not make the necessary dispositions and regulations for creating and encouraging industry. They are not cheerful in conversation, but simple and credulous, and have no aversion to a bottle if they can find opportunity; but it may easily be conceived, that this is not to be understood of all without exception. When they meet together, their chief pastime consists in reading their history (*saugulestur*); the master of the house makes the beginning, and the rest continue in their turns when he is tired. Some of them know these stories by heart, others have them in print, and those that have not, have them in writing. One of these pastimes is *rumulestur*, consisting in the recitation of some verses, which sometimes are indifferently sung. They
besides

besides amuse themselves in their meetings with what they call *wike-waka*, where a man and woman take one another by the hand, and by turns sing stanzas, which are a kind of dialogue, and to which the company sometimes join in chorus. This however affords little amusement to a stranger, as they generally sing very bad, without observing time, or any other grace, particularly as they have not the least knowledge of the modern improvements in music*.

To their diversions likewise belongs that called *glaeder*, where one among them is disguised; *ringbrud*, where ten or twelve men join hands, and form a ring in dancing; and it is reckoned a great dexterity to break through the ring, without destroying their order; *glimu-list*, which has been mentioned before, and means wrestling; *hnatt-leikur*, or playing with bowls on the

* I observed two kinds of musical instruments in Iceland, one called *laangspil*, with six brass strings; the other called *fidla*, with two strings made of horses hair: both are played by a bow. I likewise heard of another instrument called *symphon*, but I never could get a sight of it.

ice ; *lystridin*, or riding races for a wager, &c. &c.

They are famous at playing at chess, and had formerly two sorts of this game ; one of which was called *jung-fru schach* (ladies chess), and the other *riddare schach*† (knight's chess): at present only the last is customary. They also amuse themselves with *kotra* (a game at tables) they play on it *togtadilla* or *olofstafl*, when the men are ranged blindfold, without dice, according to an old song which must be said by heart: Besides these games they have others called *Mylna Faringar-tafl*, and *Goda-tafl*. They also play some games at cards, called *Alkört*, *Handkarrer*, *Tru-spill*, and *Pamphile*; all these games are merely for amusement, since they never play for money, which seems however to have been formerly customary among them, since in one of their old laws a fine is destined for those who should play for money.

† Vide letter of Arnus Magnaus to Widalin, communicated to me in manuscript by Mr. Thorotti.

L E T T E R VII.

To C H E V A L I E R I H R E.

Of the Dress of the Icelanders.

Stockholm, Sept. 6, 1774.

THE Icelanders have made very few alterations, if any, in their dress in modern times. It is not elegant or ornamental, but yet neat, cleanly, and suited to the climate. The men all wear a linen shirt next to the skin, with a short jacket, and wide pair of breeches over it. When they travel they wear another short coat (*hempa*) over it. All this is made of coarse black cloth (*wadmal*); only the inhabitants on the north side of Arnarfiord wear white cloaths. On the head they wear large three cornered hats, and worsted stockings, and Icelandic shoes on their feet.

Some of them have shoes from Copenhagen, but as they are rather too dear

dear for them, they generally make their own shoes, sometimes of ox hide, but mostly of sheep's leather: the manner in which they make them is this; they cut a square piece of leather, rather wider than the length of the foot, this they sew up at the toes, and behind at the heel, and tie it on with leather thongs. These shoes are convenient enough where the country is level; but it would be very difficult for us, who are not used to them, to go with them amongst the rocks and stones, though the Icelanders do it with great ease. I shall speak of their fishing cloaths afterwards.

The women likewise are always dressed in black *wadmál*: they wear a bodice over their shifts, which are sewed up at the bosom; and above this a jacket laced before, with long narrow sleeves reaching down to the wrists. In the opening on the side of the sleeve they have buttons of chased silver, with a plate fixed to each button, on which the lover, when he buys them, in order to present them to his mistress, takes care to have his
name

name and hers engraved. At the top of the jacket a little black collar is fixed (*strutur*) of about three inches broad, of velvet or silk, and frequently trimmed with gold cord. The petticoat is likewise of *wadmál*, and reaches down to the ancles. Round the top of it is a girdle of silver, or some other metal, to which they fasten the apron (*fwinte*), which is also of *wadmál*, and ornamented at top with buttons of chased silver. Over this dress they wear a *hempa*, or upper-dress, nearly resembling that of the peasants at Wingaker in Sweden, with this difference, that it is wider at bottom: this is close at the neck and wrists, and a hand's breadth shorter than the petticoat. It is adorned with a facing down to the very bottom, which looks like cut velvet, and is generally wove by the Icelandic women. On their fingers they wear gold, silver, or brass rings. Their head-dress consists of several cloths wrapped round the head, almost as high again as the face; it is tied fast with a handkerchief, and serves more for warmth than

than ornament : girls are not allowed to wear this head-dress before they are marriageable. At their weddings they are adorned in a very particular manner : the bride wears close to the face, round her head-dress a crown of silver gilt. She has two chains round her neck, one of which hangs down very low before, and the other rests on her shoulders. Besides these she wears a lesser chain, from which a little heart generally hangs, which may be opened to put balsam or some other kind of perfume into it.

The dress here described is worn by all the Icelandic women, high and low, without exception ; with this difference, that the poorer sort have it of coarse *wadmal*, with ornaments of brass ; and those that are easier in their circumstances of broad cloth, with silver ornaments gilt. I saw one of these dresses, which belonged to the bailiff's wife, and was worth at least three hundred dollars. Perhaps it would not be disagreeable to peruse a list of the different articles which compose an Icelandic woman's dress,

one of which Mr. Banks bought, in order to take to England, with his other Icelandic collections.

		Rix Dol.	Shil. Dan.
<i>Hempa</i> (upper dress)	-	4	0
<i>Hættve</i> (travelling hat)	-	5	0
<i>Upphlutur</i> (bodice)	-	2	24
<i>Svinta</i> (apron)	- -	6	0
<i>Treja</i> (jacket)	- -	4	3
<i>Mallinda</i> (girdle)	-	6	0
<i>Fat</i> (petticoat)	-	8	0
<i>Kjedja</i> (chain)	-	4	0
<i>Laufa prionar</i> (bodkins orna- mented with silver)	- }	6	0
<i>Koffur</i> (fillet)	- -	2	0
<i>Erma knappar</i> (sleeve-buttons)		1	24
<i>Quen vetlingar</i> (rough gloves)		0	46
<i>Aubreida</i> (a cloth to wrap their cloaths in)	- }	4	0
		<hr/> 53	<hr/> 46

L E T T E R

LETTER VIII.

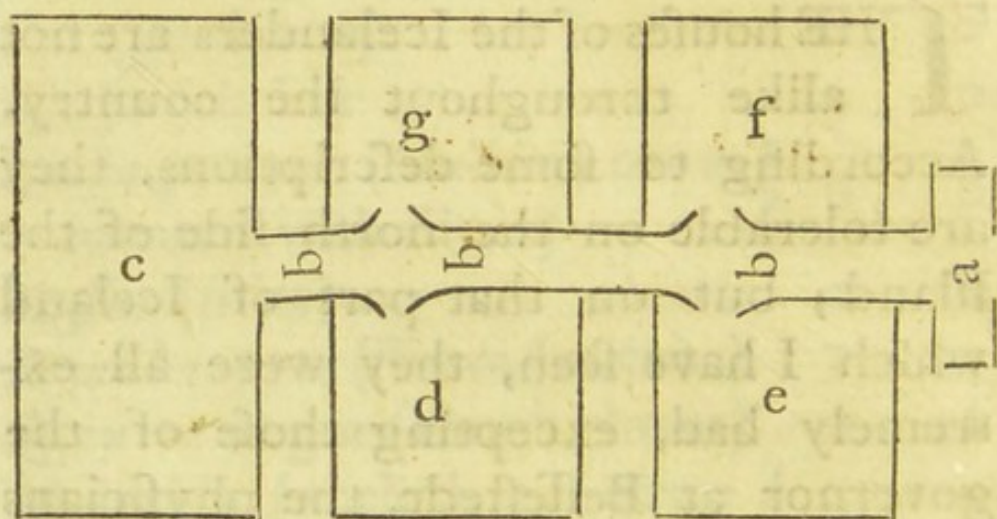
TO CHEVALIER IHRE.

Of the Houses and Buildings of the Icelanders.

Stockholm, Sept. 14, 1774.

THE houses of the Icelanders are not alike throughout the country. According to some descriptions, they are tolerable on the north side of the Island; but on that part of Iceland which I have seen, they were all extremely bad, excepting those of the governor at Bessædr, the physicians at Seltiarnarnes, and the sheriffs at Wido, which were built of stone at the king's expence. In some parts the dwellings and other buildings of the Icelanders are made of drift-wood, in others they are raised of lava, almost in the same manner as the stone-walls we make for inclosures, with moss stuffed between the lava. In some houses the walls are wainscotted

on the inside. The roof is covered with fods laid over rafting, or sometimes over ribs of whales, which is both more durable and more expensive than wood. The timber-work rests on many beams laid length-ways. The walls are about three yards high, and the entrance somewhat lower. The plan of one of these houses is here annexed, to give a better idea of it.



(a) is the door or entrance of the long lobby; (bbb) is about six feet broad, and admits the light through some holes in the roof, upon which a hoop, with a skin stretched over it, is laid. At the end of the lobby is a room (c) where the women do their work, and where the master of the house generally sleeps with his wife.

wife. The walls of this room are wainscotted ; it has a cieling and floor, sometimes even small glafs windows, but no fire-place. On both fides of this long lobby are four rooms, two on each fide, of which (d) is the kitchen, (e) the room made ufe of to eat in, (f) the dairy, and (g) the fervants room : thefe rooms have neither cielings nor floors, and the walls are feldom or never lined. The windows are made of the chorion (*liknarbelgur*) and annios of fheep (*vatzbelgur*), or the membranes which furround the womb of the ewe. Thefe are ftretched over a hoop, and laid over an opening in the roof, upon which a wooden fhutter is let down, if the weather be ftormy. They have not even a chimney in the kitchens, and only lay their fuel between three ftones, and the fmoke iffues from a fquare hole in the roof. Befides this houfe, they have a booth or fhed to keep their fifh in (*fkæmma*), fometimes another for their cloaths, &c. &c. and not far off the ftable for their cattle. In the poorer fort of houfes, they employ for

the windows the inner membrane of the stomach of animals, and which they call *skæna*; this is not so transparent as the before-mentioned membrane.

LETTER IX.

To Mrs. CARLSON.

Of the Food of the Icelanders.

Gothenburg, March 20.

THOUGH it cannot afford any great pleasure to examine the manner in which the Icelanders prepare their food, particularly after having so lately tasted at your table all the dainties of the four parts of the globe ; I will, nevertheless, perform my promise in communicating to you a description of it. Methinks I see you sometimes disdaining their dishes ; but, I assure you, an Icclander is not less happy for being unable to season his food with the productions of a distant climate : he is content with what nature affords him, satisfies the cravings of his stomach, and enjoys his health, whilst we frequently surfeit ourselves by feasting on delicacies, and loathe the most wholesome food.

The larders and pantries of the Icelanders are seldom so well stored as to contain every one of the articles at one time, which I am going to mention ; some of them, however, they must be absolutely provided with, as their food entirely consists of the following articles.

Bread of several sorts, chiefly four biscuit* from Copenhagen ; but they have not much of this, as it is too dear for them ; they content themselves therefore with providing it for weddings,

* In most northern countries the inhabitants live on rye bread ; the flour taken to prepare it is seldom bolted, and it is commonly prepared with sour ferment or leven, which gives the bread an acidulated taste, disagreeable, and resisting the stomachs of weak persons, but palatable and wholesome to those of a strong constitution. The sour paste communicates an agreeable acidity to this bread ; and as the northern climates, on account of their long winters, and the confinement of people in heated rooms full of noxious effluvia, as well on account of the chiefly salt-meat diet of the inhabitants, make the people inclined to the scurvy ; this acidulated bread, the sour-crust, and in Russia their sour drink called *Guaß*, afford such powerful antiseptics, that with the diet here described, the scurvy seldom or ever gains ground among the people. These four biscuits, no doubt, are likewise made of rye-flour, or of rye and wheat mixed together, ground without bolting, and acidulated by fermentation with sour leven,

and

and other entertainments. Some, instead of it, bake themselves bread of flour of rye, though they likewise get some from Copenhagen. The manner in which they bake it is thus: the flour is mixed with some fermented whey (*syra*), and kneaded into dough, of which they make cakes one foot in breadth, and three inches thick; these are boiled in water or whey, and then dried on a hot stone or an iron plate.

Flour of *Fiálgrás* (rock-grass*), a cask of which well cleaned and packed costs a rix-dollar; it is first washed, and then cut into small pieces by some, though the greater number dry it by fire or the sun, then put it into a bag, in which it is well beaten, and lastly worked into flour by stamping.

Flour of *Kornsyra*† is prepared in the same manner, as well as the two other sorts of wild corn *melur*‡, by

* Lichen Islandicus, Fl. Suec. 1085. Fl. Lapon, 145.

† Polygonum Bistorta.

‡ 1) Arunda arenaria, 2) arundo foliorum lateribus convolutis.

separating it from the chaff, by pounding, and lastly grinding it.

Surt smøer (four butter). The Icelanders seldom make use of fresh or salt butter, but let it grow four before they eat it: in this manner it may be kept twenty years, and even longer; and the Icelanders look upon it as more wholesome and palatable than the butter used amongst us. It is reckoned better the older it grows, and one pound of it then is as much valued as two pounds of fresh butter.

String, or whey boiled to the consistence of sour milk, and preserved for the winter.

Fish of all kinds, both dried in the sun and in the air, and either salted or in winter frozen: those prepared in the last manner are preferred by many.

The flesh of bears, sheep, and birds, which is partly salted, partly hung or smoaked, and some preserved in casks, with four fermented whey poured over it.

Misost, or whey boiled to cheese, which is very good. But the art of making other kinds of good cheese is lost,

lost, though some tolerably palatable is sold in the east quarter of Iceland.

Beina-strug, bones and cartilages of beef and mutton, and likewise bones of cod, boiled in whey, till they are quite dissolved; they are then left to ferment, and are eat with milk.

Skyr, the curds from which the whey is squeezed, are preserved in casks, or other vessels; they are sometimes mixed with black crow-berries, (*empetrum baccis nigris*), or juniper berries, and are likewise eat with new milk.

Syra is sour whey, kept in casks, and left to ferment, which, however, is not thought fit for use till it is a year old.

Blanda is a liquor made of water, to which a twelfth part of *syra* is added. In winter it is mixed with the juice of thyme, and of the black crow-berries, or the *empetrum nigrum*.

They likewise eat many vegetables*, some of which grow wild, and others are

* The following catalogue of plants used for food in Iceland is taken from the journey of Eggert Olafsen:
Rumex

are cultivated ; as also shell-fish* and mushrooms†.

The Icelanders in general eat three meals a day, at seven in the morning, at two in the afternoon, and at nine in the evening.

Rumex acetosa, in the Icelandic language called *Sura*,
 - - - digynus, - - - *Olafs Sura*.
 - - - patientia, - - - *Heimis-niole*.
 Taraxacum, - - - *Aetti-fifill*.
 Carex LIN. pinguicula, *Lifia-gras*, used against the dysentery.

Trifolium pratense flore albo.

Potentilla argentea, *Mura*.

Plantago maritima, LIN. foliis linearibus, *Kattar-tunga*.

Angelica archangelica, *Huônn* ; *Ætte-huônn*.

Lichen Islandicus, *Fialla-graus*.

- - - Lichenoides, *Klouungur*.

- - - Coraloides, *Kræda*.

- - - Niveus, *Mariu-gras*.

- - - Leprosus, *Geitna-skof*.

Arundo Arenaria, *Melur*.

- - - foliorum lateribus convolutis.

Cochlearia, *Skarfa-kaal*.

Plantago angustifolia, *Selgrese*.

Epilobium tetragonum, *Purpura-blomflur*.

Polygonum bistorta, *Kornsura*.

Sisymbrium, Lin. *Kattar-balsam*.

* Ventrosa crassa, *Kuskel*, *skelkuskel*.

Domiporta, *Kudungur*, *kufungur*, *kongur*.

Mytilus, *Kræklingur*.

- - - Major, *Ada*.

† Agaricus caulescens, pileo albo, *Ætte-sveps*.

- - - supra pileo plano, *Ætte-svepr*.

- - - subconvexo, *Reyde-kula*.

- - - of an unknown sort, *Bleikula*.

In the morning and evening they commonly eat curds mixed with new milk, and sometimes with juniper berries, and those of *empetrum nigrum*. In some parts they also have pottage of *fálgrás*, which, I assure you, is very palatable; *vállidraflí*, or curdled milk, boiled till it becomes of a red colour; *seiddmijolk*, or new milk, boiled a long while. At dinner, their food consists of dried fish, with plenty of sour butter. They also sometimes eat fresh fish, and, when possible, a little bread and cheese with them. It is reported by some, that they do not eat any fish till it is quite rotten; this report, perhaps, proceeds from their being fond of it when a little tainted: they, however, frequently eat fish which is quite fresh, though in the same manner as the rest of their food, often without salt.

On Sunday, and in harvest-time, they have broth made of meat, which is often boiled in *sýra*, instead of water; and in winter they eat hung or dried meat.

Their

Their common beverage is milk, either warm from the cow, or cold, and sometimes boiled: they likewise make butter-milk, with or without water. On the coasts they generally drink *blanda* *, and four milk; which is sold, after it is skimmed, at two-fifths of a rix-dollar a cask: some likewise send for beer from Copenhagen, and some others brew their own. A few of the principal inhabitants also have claret and coffee. The common people sometimes drink a kind of tea, which they make from the leaves of *Holta-sollyg* † and *Spudwell* ‡.

This is the usual manner of life in Iceland. In all countries the living of the poor differs essentially from that of the rich; and if an Iceland gentleman can afford to eat meat, butter, shark, and whale, the peasants are obliged to content themselves with fish, *blanda*, milk,

* In the *Elfdalln* of *Wermeland* in Sweden, the common beverage of the country people is milk, mixed with water, and called by them *Blanda*.

† *Dryas octopetala*.

‡ *Veronica officinales*.

pottage of rock-grass, and *beina-string*. Though the Icelanders cannot in general be said to be in want of necessary aliment, yet the country has several times been visited by great famines: these, however, have been chiefly owing to the Greenland floating-ice, which, when it comes in great quantities, prevents the grass from growing, and puts an entire stop to their fishing.

I need not acquaint you, that we were not necessitated to submit to their manner of life during our stay in Iceland. Instead of *blanda* we drank port, and several other sorts of good wine; and a French cook prepared for us some savoury dishes, and excellent puddings.

However, as we wished to try every thing, we prevailed upon the physician, Biarne Paulsen, who had invited us to dinner, to entertain us after the Icelandic manner. We did not forget the good Swedish custom of taking a glass of brandy before dinner, which was here genuine; we had only once Danish distilled corn-brandy, which
was

was served up with biscuit, cheese, and four butter. In the middle of the table was placed a dish with dried fish cut small; the other dishes were a piece of good roast mutton, broth with *syra*, and a dish of salmon-trouts, &c. &c. We eat with a very good appetite; but the four butter and dried fish were not often applied to: on the whole, we eat a greater quantity of bread than the Icelanders generally do.

So elegant an entertainment could not be without a desert; and for this purpose some flesh of whale and shark (*hafkal*) was served. This is either boiled or dried in the air, looks very much like rusty bacon, and had so disagreeable a taste, that the small quantity we took of it, drove us from the table long before our intention. Most probably you already thank me for my entertainment, and are happy to see the end of my letter.

L E T T E R X.

TO CHEVALIER JHRE.

*Of the Employment of the Icelanders,
and their Chronology.*

Stockholm, Sept. 6, 1774.

THE Icelanders principally attend to fishing, and the care of their cattle.

On the coasts the men employ their time in fishing, both summer and winter; on their return home, when they have drawn and cleaned their fish, they give them to their wives, whose care it is to dry them. In the winter, when the inclemency of the weather prevents them from fishing, they are obliged to take care of their cattle, and spin wool. In summer they mow the grass, dig turf, provide fuel, go in search of sheep and goats that were gone astray, and kill cattle. They likewise fill their *wadmál*, or coarse cloth; for which purpose they

H make

make use of urine, which they also employ in washing and bucking, instead of soap and pot-ashes. The men likewise prepare leather, for which they use *maid-urt* (*spiraea ulmaria*) instead of birch-rind. Some few work in gold and silver, and others are instructed in mechanics, in which they are tolerable proficient.

As a proof of this, I need only mention a sledge which a peasant contrived some years ago in the form of a ship with sails, and large enough to contain four or five persons, that would sail, in the winter season, in an even country. Unluckily, two of his sons, in sailing home from church, overturned, and broke the whole carriage to pieces.

On the west side of the country they make vessels of floating wood, large enough to contain from three to twelve tons, and make their charge according to the size of the vessel, from four to six dollars.

The women prepare the fish, take care of the cattle, manage the milk and the wool, sew, spin, and gather eggs and down. When they work in
the

the evening, they use, instead of an hour-glass, a lamp, with a wick made of *fiva* (epilobium) dipt in train-oil, which is so contrived as to burn four, six, or eight hours.

Their work is in some measure determined by their *bya-lag*, or by-laws* of their villages, in which the quan-

* “ By-laws are said to be orders made in court-leets or court-barons, by common assent, for the good of those that make them, farther than the public law binds.” *Atterbury*. See *Johnson's Dict.* Though this may probably be the present meaning of the word *By-law*, it is not, however, the original meaning of the word; for it is derived from the old Saxon word *by* or *bye*, signifying a town, from the Gothic word *bo*, to inhabit; and agreeable to this are many English names of towns, viz. *Asb-by*, *Whit-by*, &c. &c. *By-law*, therefore, signified formerly laws made by townships, and by districts belonging to a town, or to a leet, which amounted sometimes to a third part of a shire. These laws were made by common assent, and for the good of those that made them, which is, or ought to be, the chief aim of all laws, and they extend farther than the public law binds; because the law of the land must be general, and cannot provide for all particular cases of single towns and districts. The special regulations and restrictions, therefore, made by the common assent of the towns-people, for the common good of that particular town, beyond the law of the land, are *by-laws*, laws of the *bye* or *town*. The Icelandic word *bya-lag*, signifies laws of villages or townships; and it confirms the signification we have given to the English word *by-law*.

tity of work they are bound to perform in a day is prescribed to them: they seldom do so much work now, so that it is called only *medelman's värk*, or the work of a man of middling strength. According to this prescription, a man is to mow as much hay in one day, as grows on thirty fathoms square of manured soil, or forty fathoms square of land not manured, or he is obliged to dig 700 pieces of turf eight feet long and three broad. If so much snow falls as to reach to the horses bellies, which they call *quedsnio*, he is to clear away daily the snow for a hundred sheep. A woman is to rake together as much hay as three men can mow, or to weave three yards of *wadmal* a-day.

The wages of a man are fixed at four dollars, and twelve yards of *wadmal*; and those of a woman at two dollars, and five yards of *wadmal*. When men are sent a fishing out of the country, there is allowed to each man, by the *bya-lag*, from the 25th of September to the 14th of May, six pounds of butter, and eighteen pounds of dried fish

fish every week. This may appear to be too great an allowance; but it must be remembered, that they have nothing besides to live upon. When they are at home, and can get milk, &c. &c. every man receives only five pounds of dried fish, and three quarters of a pound of butter a-week.

As the division of time among the Icelanders is not determined according to the course of the sun, but by their work, this is perhaps the most proper place to say something of it. Though they have, like us, four different seasons, they only count two; the summer, which begins the Thursday before the 16th of April; and the winter, which commences on the Friday before the 18th of October. During the first season they perform their summer-work, and in the latter attend to their winter amusements. These two seasons are afterwards divided into twelve months, as with us, which have their common names; but in antient records, and among the lower class of people, are called, 1. *Midsvetrar*. 2. *Föstugangs m.* 3. *Iafndaegra m.* 4.

Sumar m. 5. *Fardaga m.* 6. *Nöttley-su m.* 7. *Midsumar m.* 8. *Heyanna m.* 9. *Adratta m.* 10. *Slaatrunar m.* 11. *Ridtidar m.* 12. *Skammdeigis m.* Day and night are not divided into a certain number of hours, but into the following divisions: *Otta* is with them three o'clock in the morning; *Midur morgon*, or *Herdís rísmal*, five o'clock; *Dagmal*, half past eight; *Haadeye*, eleven; *Nonn*, three in the afternoon; *Midur afton*, six in the morning; *Nattmall*, eight; and *Midnatt*, twelve o'clock at night.

When they want to know what o'clock it is, they attend to the course of the sun, and the flux and reflux of the sea; but generally they make use of an art to discover the sun by their fingers. Watches are very rare among them; every peasant, however, has an hour-glass.

L E T T E R X I.

To CHEVALIER BACH.

Of the Diseases in Iceland.

Stockholm, Oct. 1, 1776.

YOU require, Sir, that I should give you some account of the diseases common in Iceland. I will obey your commands, though it is more the province of a physician to undertake the subject, as it requires so much exactness and penetration.

As I have been so happy as to be unacquainted with any disease from my own experience, I have as little endeavoured to gain any knowledge by reading such books as treat of them; you will therefore pardon me if my account is not very perfect.

The climate of the country, and the purity of the air, contribute very much to make the Icelanders strong and healthy, though their food and way of life frequently produce the

contrary effect. Young children, for example, are not suckled more than two or three days, and afterwards brought up with cows milk, which, in times of dearth, is mixed with flour and water.

I remember to have heard, that this is also customary in some parts of Finland; but a different manner of living may render that unwholesome in Iceland, which is less dangerous in another place: and I think I may safely venture to affirm, that the food and mode of living in Iceland do not at all contribute to the strength of the inhabitants. One seldom meets with any of them above 50 or 60 years of age, and the greater part are attacked in their middle age by many grievous complaints.

It is remarkable that among the female sex, who there, as almost everywhere else, live to a greater age than the men, those particularly attain to an advanced life who have had many children. There are a great many of this class, as the women are commonly very fruitful; and it is no rare thing to meet with
a mo-

a mother who has had twelve or fifteen children.

Among the diseases that are most prevalent, the scurvy (*Skyrbuigur*) is the most common. In some, it makes its appearance in the same manner as with us, but in others it produces the most dreadful symptoms, and is then called *liktraad*, or leprosy, which, however, differs from that horrid disease so common in the East. Its first appearances are, swellings in the hands and feet, and sometimes also in other parts of the body: the skin becomes shining and of a bluish cast, the hair falls off, the sight, taste, smell, and feeling are weakened, and often quite lost; biles appear on the arms, legs, and face; respiration becomes difficult, and the breath foetid; aching pains are felt in all the joints, a breaking-out spreads over the whole body, and is at last converted into wounds, which generally terminate in death.

The Icelanders make use of antiscorbutic decoctions, likewise baths, with turnips boiled in them; but chiefly

chiefly mercurial remedies, by means of which the disease may be removed in its beginning. This disease is not contagious, but very obstinate; and it is remarkable, that two generations may be entirely free from it, when it shall appear in the third. It does not always prove mortal, though many are tormented with it twenty or thirty years.

The gout (*torvark*) most men have in their hands who go out a-fishing, probably because they are obliged to handle and manage the wet fishing-tackle in cold weather.

The St. Anthony's fire, in Icelandic *a ama*, is pretty common. They make use of earth-worms (*anamadkur*) to cure it, which they bind alive on the wounded part; and when they become dry, others are applied till the disease is removed.

The jaundice, in Icelandic *guulfot*; the fever, *kvefsot*; the pleurisy, *tak*, which is sometimes infectious, and then is called *landfarfot*, or an infectious disease, is frequently got by cold; lowness of spirits, *careinoma infantum*, in Icelandic *krabbe*, *a atumein*, the

spleen, and obstructions, are very common. In later years the rickets made their appearance; and the venereal disease was not known among them till the year 1753.

Besides the antiscorbutic plants, which are to be found in plenty in Iceland, they have a number of hot baths, which are of great benefit in the cure of these diseases.

There is an apothecary's shop established on the island, and four hospitals for the poor and leprous, the care of which is committed to their most skilful physicians, with proper assistants.

LET.

LETTER XII.

TO CHEVALIER IHRE.

*Of Fishing and Fowling, and the Breed
of Cattle in Iceland.*

Stockholm, Oct. 3, 1774.

THE inhabitants who live near the coasts employ themselves almost all the year in fishing; and even those who live in the inland parts of the country come to the sea-shore at certain seasons of the year. Every master of a family has a particular fishing-dress, and is obliged to furnish one to his servant as soon as he puts out to sea. They are made of sheep or calves skins, which, in manufacturing, are frequently rubbed over with train-oil. They consist of the following articles: *Leistrabrakur* are breeches and stockings all in a piece, which come up pretty high above the hips, and are laced on very tight; *stackur*, a wide jacket

jacket fastened round the neck and the middle of the waist ; *taatillar*, or coarse fulled stockings, or stiff worsted ; and *ssoskor*, or water-shoes, of thick leather.

Their boats are commonly small, and only contain from one to four men, with these they fish near the shore ; but with their larger boats, which are made to contain from twelve to sixteen men, and are provided with sails, they frequently venture from four to eight miles from the shore.

In these vessels they always carry a man extraordinary, whom they call *formann*. He sits at the helm ; and the others, who are called *haafeters*, obey his commands. At his call they all assemble at an appointed time near the vessel, provided with knives, fishing-lines, and other proper tackle : they make use of shells, and sometimes the flesh of qudarupeds and birds for bait.

As soon as the boat is off the shore, they all take off their hats and caps, pray for good success, and recommend them-

themselves to the divine protection by a prayer and hymn, which they call *vararsaungur*, and then stand out to sea. As soon as they are come to a place where they expect a good draught, two of them sit down at the helm, to prevent the boat's being moved out of its place by the current, and to take care that the fishing-lines are not entangled. In this manner they continue fishing the whole day; and when the boat will not contain any more fish, they cut off the heads of all the fish they have caught, which they throw into the sea, together with their entrails. This not only enables them to carry a greater number of fish ashore, but also invites many insects to the place, which affords good bait.

At their return, all the fish are brought ashore, and divided into equal shares: one share belongs to the owner of the boat, though he should not be out at sea with them, and this is called *skipleiga* (*shipshire*); another is given to him who sat at the helm; a third to him who governed the sails; in a word, every fisher gets a share. But this equal di-

vision is only made with the smaller fish; for if any one in the boat is so fortunate as to catch a turbot or other valuable fish, it is immediately cut into pieces, and the three best given to him who caught it.

As soon as they have thus shared them, every one cuts off the heads of his fish, draws them, and after cutting them up from top to bottom on the side of the belly, take out the backbone from that part where it is fixed to the head, down to the third joint below the heart. If the weather be such as to give them hopes of drying their fish next day, they lay them with the fleshy side facing one another; but if the weather is unfavourable, they lay the pieces on a heap with the skinny side uppermost, and this they call *lagga i kase*; if they lie too long in this position (one above another) they spoil, and are then sold to the merchants at a lower price, under the denomination of *kasad fisk*. When the weather is fair, these pieces are spread separately on stones, or on the shore, and are frequently turned by the

the women, till they are entirely dry ; this often requires a fortnight's time, and sometimes more. The fish prepared in this manner are called *flat-fiskur* (flat-fish).

In some parts they do not dry the fish on stones or on the shore ; but after they have ripped them up, place them in rows on stones which are laid cross-wise in a house built for that purpose ; these huts are called *hiallur* in Iceland, and somewhat resemble the sheds in which smiths shoe horses. These fish are called *hengi-fiskur*, or hung fish.

The fish they principally catch is cod, of which they have several different sorts, under the names of *thyrsk-liugur*, *upse*, *isk*, *langr*, *kerla*, &c. &c. Besides these they have soles, flounders, herrings, salmon, salmon-trout, trouts, and several others. Of the trouts it has been observed, that when they come up the rivers and brooks, and approach the hot springs, they are fond of staying in the lukewarm water, where they grow so fat as to be scarcely eatable.

It is unnecessary to say, that the seas, as well as the rivers and lakes, abound with fish: I will therefore only mention the whale, of which there are several sorts, divided by the natives into two classes, those with and those without tusks.

The first are again divided into *skidis fiskur*, smooth-bellied, and *reydar fiskur*, or wrinkle-bellied. Among the *skidis fiskur*, who have whalebone instead of teeth, the *flettbakr*, whose back is flat, is the largest; and some have been caught one hundred yards in length. The *hnufubakr* has a hump on his back, and is next in size, being from seventy to eighty yards long. Of all the known whales, the *steipereidur*, which belongs to the class of the *reydar fiskur*, is thought to be the largest, as there are some one hundred and twenty yards in length. Then follow the *hrafñ reyður* and the *andarnefia*; they are all considered as very dainty food; and the Icelanders say, the flesh has the taste of beef.

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The whales which have teeth instead of whalebone, are also divided into two classes, those that are eatable and those that are not. To the first class belong the *bnyfen*, *bnydingur*, *hundfiskur*, and *haabyrningur* : to the last, to which the name of *illwhale* (bad whales) is given, are reckoned the *rodkammingur* and *naahvalur*. These are forbidden as food by some ancient regulations, and particularly by the church laws. The Icelanders believe, that the first sort are very fond of human flesh, and therefore avoid fishing in such places where they appear.

The other kinds of whales are sometimes struck with harpoons, and sometimes caught with nets. The Icelanders, however, seldom venture to attack the larger ones, as their boats are small, and they unprovided with instruments proper for that purpose. They stand in so great dread of some of them, that when out at sea, they are afraid to mention even their names, and carry dung, brimstone, juniper-wood, and some other articles of the same nature in their boats, in order to terrify and prevent their too near approach.

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Notwithstanding, it now and then happens that they catch some of the largest sort, which is done when the fish approach too near the shore at high water, and are unable to return as fast as the water ebbs, where they are killed with stones and lances. In this manner they had caught a large whale the year before our arrival at Hafnefiord.

To their fishery likewise may be reckoned the catching of *liadogs*, which is very considerable in some parts. They have four sorts of them, *rostungur*, *vade-selur*, *blaudu-seller*, and *gran-selur*. They are fattest in winter, and yield three or four pounds of fat, of which each pound produces seven quarts of oil: in summer, on the contrary, they are very lean. Their flesh is eaten, and their fat sold at five yards a pound. The skin is sold by weight, at the rate of sixty yards for twenty pounds.

Though the situation of Iceland renders it extremely proper for fishing, the fishery has decreased very much lately; which is partly

owing to the many foreign ships which yearly come to fish in those parts, and partly to the want of men, as the number of people has decreased greatly. But I believe the chief cause is the monopoly of the trading company, which very much oppresses the country.

If the people had more encouragement, there would be more emulation and diligence amongst them than at present; for they are obliged to sell a *vaett*, or five pounds of dried fish to the company, at the rate of five-sixths of a dollar, which they sell in Hamborough, where the greatest part of what is caught in Iceland is usually sent, for five banco-dollars.

Next to fishing the principal support of the Icelanders is the breeding of cattle.

Their beeves are not large, but very fat and good. It has been reported by some, though without foundation, that there are none among them with horns: it is true however that they seldom have any.

They keep their large cattle at home in their yards the greater part of

of the year, though some have places appropriated to them in the mountains, which they call *fatr*, where they send their cattle during the summer, till the hay harvest is over. They have a herdsman to attend them, and two women to milk them, and make butter and cheese. It is common to meet with oxen running wild about the mountains, which are however drove home in autumn, as every one knows his own by a particular mark put upon them.

The principal food of the cattle is hay, and they reckon a stack of hay for a cow's winter provision ; one stack consists of thirty cocks of hay grown on manured land, and forty cocks grown on unmanured land. When there is a scarcity of fodder, they feed them in some parts with *steenbitr*, a kind of fish, which, together with the heads and bones of cod, is beaten small, and mixed with one quarter of chopped hay. The cattle are fond of it, and yield a good deal of milk after it ; but yet it is said

to have a bad taste : they only make use of this food in time of need.

Their cows yield four quarts of milk a day, though they have some that give from eight to fourteen in four-and-twenty hours. A cow that yields six quarts is reckoned a good one and must not stand dry above three weeks before she calves.

A young calf is fed with milk for ten days or a fortnight, afterwards the milk is mixed with water and chopped hay, and at last they give it whey instead of milk.

The usual price of a cow, as well as of a horse, is one hundred and twenty yards, thirty of which makes a dollar. However, sometimes the better sort of horses are sold for eight or ten dollars. They have yet less trouble with their horses than their cows ; for though some saddle-horses are kept in stables during winter, the greater number of them are obliged to provide for their own subsistence, and when they cannot find this on land, they go in search of sea-weeds
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on the coasts: but when a great quantity of snow has fallen, the natives are obliged to clear it away for them.

There is no breed of cattle so much attended to in Iceland as that of sheep. As these can easily find subsistence there, the Icelanders look upon it as less troublesome and less expensive to breed them; and there are many peasants who have between three and four hundred sheep. Before the epidemical disease, which raged among the sheep from 1740 to 1750, it was not uncommon to see flocks of one thousand or twelve hundred, the sole property of one person.

I will not venture to examine, whether it would be more advantageous to husbandry to keep more cows than sheep; but as the inhabitants seem to be more inclined to breeding of sheep, it would be well if such regulations were made as might enable them to cultivate it with more advantage.

This has really been thought of by government; for about twenty years ago they sent baron **Hastfer**, a

Swede by birth, to Iceland for that very purpose. He made several regulations, and invented and prepared a kind of powder, as a cure for the diseases among sheep, which is very much made use of there, as well as in Denmark and Norway. They speak of him every where in Iceland, as of a man who had great knowledge in this branch of husbandry, and a sincere desire to redress all defects.

I know not if the report was well founded which was spread all over the country, that the trading company endeavoured to obstruct him in the execution of this design : so much however is certain, that the country has reaped little or no benefit from baron Hastfer's depositions.

The Icelandic sheep differ from ours in several particulars ; they have strait ears standing upright, a small tail, and it is common to meet with sheep that have four or five horns : in some places they are kept in stables during winter, but they are generally left to seek their food themselves in the fields.

It is remarkable that they are fond of hiding themselves in caves (of which there are a great many in Iceland) in stormy, tempestuous weather. But when they cannot find any retreat during a heavy fall of snow, they place themselves all in a heap, with their heads to the middle, and bent towards the ground, which not only prevents them from being so easily buried under the snow, but facilitates the owner finding them again. In this situation they can remain several days; and there have been examples of their having been forced by hunger to gnaw off each other's wool; which forming into balls in their stomachs, presently destroys them. They are however generally soon sought for and disengaged. There are no wild sheep, as has been pretended by some, for they all have their owners, who keep an exact account of them; and when they are driven to the mountains, they are scarcely ever without a shepherd to attend upon them.

Their food is grass and herbs, and the scurvy-grass (*cochlearia*) in particular

ticular makes them so fat, that they yield more than twenty pounds of fat. They reckon one cask of dunged hay, and two not dunged, for a sheep's winter provision. When there is a bad crop, they are obliged to put up with fish bones chopped, as well as the other cattle.

Good sheep give from two to six quarts of milk a day, of which both butter and cheese is made; it has likewise a good taste when boiled.

The principal profit they have from their sheep arises from the wool; this is not shorn off as among us, but remains on till the end of May, when it loosens of itself, and is stripped off at once like a skin, and is then called *Ullafæl*. The whole body is by this time covered again with new wool, which is quite short and fine, and of better quality than the Swedish. It continues to grow the whole summer, and becomes coarser and stiffer towards autumn; it is likewise smooth and glossy, somewhat resembling camel's hair, but more shaggy. This covering enables the sheep to support
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the rigours of winter ; but after they have lost their wool, if the spring proves a wet one, they take care to sew a piece of coarse cloth round the stomach of the weakest, and those that have least wool.

A good sheep, against which no exceptions can be made, must, according to their by-laws, at least afford four pounds of wool, and it is not uncommon for them to produce more.

It is not unusual for an ewe to have two lambs at a time, and sometimes even three ; they then take away one lamb from the mother, and give it to another who has lost hers. When the lambs are too weak to follow the mother, they are kept at home and fed upon milk, which is done by means of a quill and a wet piece of skin.

The price of six ewes, from two to four years old, together with their lambs and wool, is four dollars in autumn, according to the land-tax : a weather of four years old is sold for one dollar ; but it is the custom for a merchant to pay only five marks. If any body sells a lamb ready killed, it is valued according
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ing to the quantity of fat which it has, at the rate of two marks for every pound. The flesh alone, without the head, feet, entrails, fat, skin, and wool, is valued at twenty yards, and the by-laws fix the price of a pound of dried mutton at half a yard. The skin is sold by weight, after the rate of thirty fish for ten pounds.

They have goats in some places, but they are few in number; and, upon enquiry, I found the reason to be that they do not thrive in a country where there is no wood.

Besides these animals they have three kinds of dogs in Iceland, *fiar hundar*, or *lumbar*, shag dogs; and *dyrhandar* and *dverghundar*. As also tame and wild cats, which last are called *urdarkettir*; rats, white and brown foxes, some of which eat grass, and are on that account called *gras tofur*. To root out these animals, the king has set a premium of a rix-dollar upon every ten fox skins that are sold to a merchant. The natives have likewise made an agreement, that whosoever destroys a fox's hole, together

ther with the fox, the she fox, and their young, is to receive one rix-dollar, which the neighbours collect among themselves.

Rein-deers were not known here formerly; but by governor Thodal's order, thirteen heads were sent from Norway in 1770, by Mr. Perrenson, merchant: ten of which died before they reached Iceland, for want of proper care: the three remaining ones thrive extremely well, and had calved three times before we came there: they do not want for food, as the country abounds with moss.

After having treated of their fishery, and the breed of their cattle, I think this a very proper place to say something of their birds, which, particularly in regard to those of the aquatic kind, are very important to them.

They are found in great abundance every where on the coast; but the greatest number by far are caught in the few places where they breed. The eggs the Icelanders make use of themselves, as likewise of the flesh, which is eaten by a great many of them;

but with the feathers and down they carry on a very considerable trade.

It would be unnecessary to mention all the different sorts of birds, especially as there is scarcely any country where so many kinds, and such great numbers of them, are to be met with as in Iceland. Among the great abundance of geese, water-fowls, ducks, &c. &c. I will however say something of the swan and the eider-bird.

It is known that the swan belongs to the class of birds of passage; their numbers increase very much towards winter, though there is no scarcity of them at any time, as the greater part of the young breed constantly remain there. In spring we may often see an hundred of them in a flock, and frequently many more; and it is then thought that part of them advance yet further to the north, and makes but a very short stay in Iceland. During summer they resort to the lakes; but when winter approaches, and they begin to freeze, they remove to the sea shores. Their eggs are gathered in the beginning of spring, which are large, and said to be
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very palatable. In August, when they lose their feathers, they are hunted on the lakes, where they are to be found at that time, with dogs trained to catch them alive. They are said to sing very harmoniously in the cold dark winter nights; but though it was in the month of September when I was upon the island, I never once enjoyed the pleasure of a single song. An old swan has a fishy taste, but the young ones are reckoned among the best eatable fowls.

The eider-bird is yet more useful to the natives, who consider it as a kind of treasure; and it is seldom heard that a prudent house-keeper shoots or kills any of them.

The eider-birds generally build their nests on little islands not far from the shore, and sometimes even near the dwellings of the natives, who treat them with so much kindness and circumspection, as to make them quite tame. In the beginning of June they lay five or six eggs, and it is not unusual to find from ten to sixteen eggs in one nest together, with two females, who agree remarkably well

well together. The whole time of laying continues six or seven weeks, and they are fond of laying three times in different places: in the two first, both the eggs and down are taken away, but in the last place this is seldom done. Those to whom one of these places belong, visit it at least once a week.

When they come to the nest, they first carefully remove the female, and then take away the superfluous down and eggs, after which they replace the female on the remaining ones, when she begins to lay afresh, and covers her eggs with new down which she has plucked from herself: when she has no more down left, the male comes to her assistance, and covers the eggs with his down, which is white, and easily distinguished from the female's; where it is left till the young ones are hatched, who in an hour afterwards quit the nest together with the mother, when it is once more plundered.

The best down and the most eggs are got during the first of their laying; and

and it has in general been observed, that they lay the greatest number of eggs in rainy weather. As long as the female sits, the male is on the watch near the shore; but as soon as the young are hatched, he leaves them. But the mother remains with them a considerable time after; and it is curious to see how she leads them out of the nest as soon as they creep out of the eggs, and goes before them to the shore, whilst they trip after her: when she comes to the water side, she takes them on her back, and swims with them for the space of a few yards, when she dives, and the young ones, who are left floating on the water, are obliged to take care of themselves. One seldom sees these birds on land afterwards, for they generally live in the damp rocks in the sea, and feed on insects and sea-weeds.

One female, during the whole time of laying, generally gives half a pound of down, which is however reduced to one half after it is cleansed. The down is divided into *thang-duun* (sea-weed down) and *gras-duun* (grass down),

down). The last sort is thought to be the best, and is cleansed in the following manner ; some yarn is streaked in a square compartment round a hoop, on which the down is laid. A pointed piece of wood is then moved backwards and forwards on the lower side of the yarn thus streaked, which causes the coarser feathers to fall through, while the fine down remains on the yarn.

Down plucked from dead eider-birds is of little worth, because it has then lost the greatest part of its elasticity ; for this reason it is of little value in Iceland. The other sort is sold at forty-five shillings a pound when cleansed, and at sixteen shillings when not cleansed. There are generally exported every year on the company's account 1500 or 2000 pounds of down cleansed and not cleansed, exclusive of what is privately exported by foreigners. In the year 1750, the Iceland company sold as much in quantity of this article, as amounted to 3745 banco-dollars, besides what was sent directly to Gluckstadt.

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Among the land birds that are eatable, ptarmigans are not to be forgotten, and are caught in great numbers. Falcons also abound in the island, of which there are three sorts: they are purchased by the royal falconers, who give fifteen dollars a-piece for the white, ten for those that are darker, and seven for the grey.

L E T T E R XIII.

To CHEVALIER IHRE.

Of the Trade in Iceland.

Stockholm, Nov. 12, 1774.

THE Iceland trade has been subject to many revolutions. Till the year 1408 the Norwegians were almost the only nation who sailed to Iceland, and bought all the fish the Icelanders did not consume or export in their own ships. The English afterwards had this trade till the Reformation, when it fell into the hands of the Germans, and was peculiarly advantageous to the Hamburghers. But Christian the Fourth, who had the improvement of the whole Danish trade very much at heart, likewise directed his attention towards Iceland. He prohibited the trade of the Hans-towns thither in the year 1602, and bestowed it on Copenhagen, Malmo, and

and some other towns at that time subject to the crown of Denmark.

The Iceland company at Copenhagen was, however, not established till the year 1620, after the king had once more prohibited the trade of the Hans-towns to Iceland in 1619. This company continued till the year 1662, when it was suppressed by a special order. What contributed to this was the great damage done in Iceland by some pirates in 1627, who carried away great number of its inhabitants; the greater part of whom were, however, redeemed by the king nine years after. The king resented this so much the more, as the Iceland company had not only undertaken to provide the country with all necessary articles, but likewise to protect it. This circumstance produced a disagreeable effect to the company, which was, that those who had shares in the stocks of 1000 dollars, only received 500; and those who had shares of 200 dollars, received not the least consideration. The company paid a certain sum to the king for every haven, and two rix-dollars to the

governor for every ship. It was likewise obliged to contribute something to the king's magazines on the Westmanns Islands.

The trade of every haven was afterwards disposed of to the highest bidder once in every six years; but since 1734 it has been in the possession of a trading company, who have a grant of it, for which they pay a duty of 6000 dollars a year to the king. They send from 24 to 30 ships thither every year, loaded with corn, bread, wine, iron, and wood, &c. &c. and they export in return from 22 havens, fish, flesh, butter, blubber, skins, wool, and woollen manufactures, which they exchange against the merchandize they have brought thither according to a tax published in the year 1702. It is difficult to determine whether the company gains much by this trade or not; so much at least is certain, that the Icelanders lose by it; for the Dutch, disregarding or evading the tax, import much better goods than the company. For this reason the Icelanders sell a considerable quantity of fish to
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them privately, though several Dutch ships have been confiscated on account of carrying on a smuggling trade. The agents of the Iceland company are aware of this, by the small stock that remains for their purchase, with which they are much dissatisfied.

There is a market kept every year at Hraundals-retter, to which those resort who live up the country: they exchange butter, cloth, and sheep, for fish, blubber, and other articles of that kind. At Reikavik there is a woollen manufactory, where ten or twenty workmen are employed: one likewise meets with a few looms here and there; and many more might be established amongst the peasants, if encouragement was given them.

Danish money is current in the country, but the whole stock of ready money cannot amount to many thousand dollars. Their accounts are not all kept in money, but according to yards and fishes: 48 fishes, each fish reckoned at two pounds, make one rix-dollar, and twenty-four yards make one likewise. You may buy a horse for 150 fish, and a farm for 6000

yards. A *vatt* is 100 pounds, and *faering* ten. They reckon 163 quarts to a tun, and five to a *kuttur*. The Icelandic ell is as big as the Hamborough ell, three of which make a fathom.

LETTER

L E T T E R XIV.

T O C H E V A L I E R I H R E.

Of the Icelandic Literature.

Stockholm, Dec. 4, 1774.

THE history of antient times shews us that our ancestors did not despise arts and sciences, though they peculiarly distinguished themselves by valour and heroic deeds. Their religion, mixed with fables, was, however, reduced to some rule; and their system of morality, though not the purest and best; yet inculcated certain virtues, which were in vain sought for among the more enlightened Greeks and Romans. The long voyages they made without knowing the use of the compass, is a proof of their having been much better acquainted with astronomy and geography, than could have been expected. Physic, and particularly surgery, must have

have been held in high esteem among so warlike a nation, though I question very much whether any person could now submit to the manner of curing an external hurt, such as was practised among the ancients. Their invention exhibits itself in riddles, history, and poetry; and how highly these were valued among them, may be proved by many examples, of which I shall only mention Egil's poem, in praise of Erick Blodoxe king of Norway, by which he saved his life; and Hiarne's epitaph on king Frode, on account of which he is said to have been made king of Denmark.

Though it cannot be entirely ascertained, that Odin brought the Runic characters to the north; yet it is proved almost beyond a doubt, that they were known among us in the fifth and sixth centuries. The art of writing was also known here, if not certain, at least, as early as among the Franks and Germans; the former had no letters before they began to make use of the Latin ones in the sixth century, and the latter were likewise unacquainted

acquainted with them before the time of Charlemain.

Their taste for riddles, stories, and poetry, the Icelanders also brought along with them from their native country, to the island where they are now settled ; and whilst these traces of science diminished in Norway, on account of the troubles which shook the whole north during several centuries, they not only preserved themselves in Iceland, which was not exposed to so many disturbances, but the care of their safety likewise excited the inhabitants to apply themselves to the study of history, that they might by it be informed of the designs of their powerful neighbours, and take the best and most necessary measures to oppose those who only wished for an opportunity of subjecting them to their yoke.

It is true they had no schools or public seminaries for the instruction of youth in the sciences, before the introduction of the Christian religion ; but it was, however, not altogether neglected, for they took great pains, besides inuring the bodies of their young men to
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feats of strength and agility, and teaching them such exercises as enabled them to defend themselves and their countrymen, to instruct them also in history, religion, and law. Thence we find in their ancient chronicles frequent mention of persons who had made considerable progress in these sciences, and even before they received the Christian religion there were a number in the country well versed in the laws.

In their frequent voyages, before the use of the compass (*Leitarstain*) was known to them, they discovered new countries, when driven out of their course, which were however deserted almost as soon discovered: however, some, if not all of them, have been discovered in later times.

Thus Bjorn Herjulfson, in a voyage he made to see his father in Greenland, was driven by a strong north-wind upon a flat woody country, from whence he afterwards reached his father, after a long and troublesome voyage, without thinking any more of his new discovery. After the death of his father,

ther, he again returned to Norway ; where the account of his voyage raised an inclination in Leifer to go in search of this country. He therefore set sail with 35 men, and at first landed on a mountainous country covered with snow, without the least appearance of verdure : from whence he continued his voyage, and came to another country which was flat and woody ; this he named Markland. He set sail again with a north-east wind, and in two days time arrived at an island which lay north of the continent. He now entered westward into a straight where his ship struck on the sand at low water ; he then had it drawn ashore with cables, and having built a house, remained there the whole winter : here they did not experience the least cold, and the grass only grew a little reddish in winter. The days were not of so unequal a length as in Iceland ; and the sun appeared above the horizon on the shortest day, both when they breakfasted and at supper-time. The vine and wheat both grew wild, and this occasioned their giving the name of Vineland

Vineland to the country. This gives us room to conjecture that he advanced pretty far towards the south of America. They afterwards carried on a trade with the natives of the country, whom they called Skralingar, for a long time, which, however, ceased at last, and the country, and even its name, are now totally forgotten.

Poetry formerly flourished very much in Iceland, Egil Skalla Grimson, Cormak Ogmundson, Glum Geirson, Thorleif, Jarlar Skald, Sighvatr, Thordson, Gunlaug Ormstunga, and Skad Ralfn, are celebrated as great poets. The art of writing was not, however, much in use till after the year 1000. It is true the Runic characters were known in the country before that period, and most probably brought thither from Norway. Though we have no reason to believe they were cut upon stones, as was practised among us (no Runic stones having been found there, whose age reaches to the times of Paganism); they used, however, to scratch them on bucklers, and sometimes on their cielings and walls: and the

the *Laxdaela Saga* makes mention of one Olof of Hiardarhult, who had a large house built, on the beams and rafters of which remarkable stories are said to have been marked, in the same manner as Thorkil Hake cut an account of his own deeds on his bedstead and chair. That Runic characters were made use of before the introduction of the Christian religion, may be proved by Olof Tryggvasson's Saga, where he makes mention of a man, whose name was Oddni, who, being dumb, made known, by means of Runic characters, that he had been insulted by Ivar, his father's guest.

After the reception of the Christian religion in the year 1000, the sciences took another form. The Latin characters were immediately adopted; as the Runic alphabet, which only consists of 16 letters, was found insufficient. The first Icelandic bishop, Isleif, founded a school at Skalholt; and soon after they founded four other schools, in which the youth were instructed in the Latin tongue, divinity,

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and

and some parts of theoretic philosophy. Jonas Ogmundsson, first bishop of Hoolum, sent to Gothland in the year 1120 for one Gisle Finson to superintend the school at Hoolum. Arngrim Jonson, on this occasion, mentions a remarkable circumstance in his *Crymogaea*, p. 108. of the architect Thorodr, who, as he was employed in building the cathedral church at Hoolum, paid so much attention to the grammatical lessons given to the school-boys, as to make a considerable progress in them himself. The same author also mentions, that the bishop, who was a learned and zealous man, having one day surprized one of the scholars in reading Ovid's letters, and book *De Arte Amandi*, was so incensed thereat as to strike the book out of his hand. At a time when no great knowledge of the Latin language could be expected even in Sweden, an Icclander however was found of sufficient capacity and learning to instruct the young people to read and understand the Latin poets. But notwithstanding the sciences were there only in their
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infancy, those who desired to make greater progress in them, studied in foreign universities. Gíslur Ísleifson studied at Erfurt ; and many resort to Paris, as Samundr Sigfússon did, from whence they were called *Parisklarkar* (Paris-writers). Many, however, whose names are become celebrated, have only studied in Iceland : as a proof of which, I will only mention the two most famous Icelandic writers Are Frode and Snorre Sturleson. It may therefore be affirmed that Iceland, from the introduction of the Christian religion there till the year 1264, when it became subject to Norway, was one of the few countries in Europe, and the only one in the north, where the sciences were cultivated and held in esteem. This period of time has also produced more learned men than at any other period since. We need only read their ancient chronicles, to be convinced that they had great knowledge in morality, philosophy, natural history, and astronomy. They had tolerably clear ideas of divinity, and used to read the Fathers : but their

L poetical

poetical and historical productions, in particular, have bid defiance to time, even when ignorance was again beginning to resume her empire. It would be an easy matter to mention a number of poets who distinguished themselves, not only in Iceland and the Orkneys, but likewise at the Swedish, Danish, Norwegian, and English courts, as the *Skaldartöl* (or list of poets) contains no less than 240: but it will be superfluous to mention here any more than the three principal ones, viz. Snorre Sturleson, who was beheaded in the year 1241, in the 63d year of his age, at Reikholt in Iceland; Olafr Huitaskald, who died in 1259; and Sturla Thordson, who made his exit in 1284. Some extracts of the works of these authors are inserted in some printed and manuscript chronicles.

Of much greater importance are their sayings or histories, the utility and authenticity of which have caused so many disputes: for if they have been considered by some as sure and irreversible supporters of the history of
of

of our forefathers, they have been looked upon by others as absurd inventions and falshoods, which belong to the same class as the history of the knight Finke, Fortunatus, the horned Siegfried, and other old women's tales. This last opinion is no less unreasonable, than an excess of veneration paid to them would be inconsiderate and rash. When they are consulted with circumspection and judgment, they are undoubtedly of great use, so much the more, as they are the only remaining monuments of the antient northern history ; and indeed some of them are written with great judgment and perspicuity.

The *Aræ Frodes Schedæ* were written since 1122, and are the most antient Icelandic accounts extant. The writings of Sturleson, Gunlaug, Odde, and several others, are all of them works that will never be lost or hurt by time ; and I do not find any thing in them which should induce us to deny them the same credit that we so implicitly give to the writings of Tacitus and Livy.

No one can doubt, that even those authors in the compilation of their histories, which have been considered as patterns of language, have made use of the information of other writers. Nor have our Icelandic historians been remiss in this ; for Sturleson himself quotes Are Thiodolfr, the *langfedgatal*, or genealogical table, and some ancient songs in which their kings were celebrated ; from which indeed he compiled his accounts.

The Icelanders were remarkably studious in preserving the memory of their ancestors ; and it was the most agreeable occupation in their meetings and assemblies, to repeat those histories and poems for which their great men had been renowned, as was the practice among the Greeks. Add to this, the contents and composition of the writings themselves, which plainly prove, that the authors have not been inclined to relate marvellous stories ; and it would be unjust to refuse them that reliance on their veracity, which we without hesitation bestow

flow on other writers of the same class.

The greatest part of their works were composed in the 11th, 12th, 13th, and 14th centuries; and some of them have even appeared in print. I have a list of these histories in my possession; and though they are by no means of the same degree of merit, it will perhaps not be disagreeable to you to have a copy of it, as it is not only a proof of their love of science, but likewise of their application.

As a fresh instance of their accuracy and assiduity in study, I must likewise mention their chronicles, in which they recorded whatever happened of importance both in Iceland and abroad. These annals are in general considered as more authentic than their sayings. Semundr and Are Frode were the first who introduced them, and they have since been continued down to our days. The following are considered as the best.

1. *Flateyar Annal*, which reaches to the year 1395, and of which

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2. *Vat-*

2. *Vatnsfiardar Annal* is a supplement which extends to 1660.

3. *Skallholt*.

4. *Hola*.

5. *Odda*.

6. *Biiirns a Skardzaa* to 1645, of which

7. *Hests Annal*, which goes down to the year 1718, is a supplement. *Hrafnagils Annal* begins where the last leaves off, and continues to 1754.

8. *Odds Ejriksonar a fitium* to 1680.

9. *Annales Regii*, which go to the year 1341.

10. *Hirdstöra*.

11. *Laugmanna*.

12. *Biskupa*.

13. *Annales antiqui*.

14. *Annales vetustiores* go to the conclusion of the 13th century. *Bjarne Halldorson's* annal, as I have been informed, begins about the middle of the 7th century, and reaches quite down to 1772.

But even here the sciences have been subject to the same revolutions, which they have experienced every where else.

else. The lustre in which they had maintained themselves so long, was succeeded by the most profound obscurity. To give a clearer idea of this, I shall borrow the expressions of the learned bishop of Skallholt, Dr. Finneus, on this occasion, who compares the state of the sciences in Iceland to the four stages of human life, in his well-written Hist. Eccl. Islandiæ. Their infancy extended to the year 1056, when the introduction of the Christian religion produced the first dawn of light. They were in their youth till 1110, when schools were first established, and the education and instruction of youth began to be more attended to than before. Their manly age lasted till about the middle of the 14th century, when Iceland produced the greatest number of learned men. Old age appeared towards the end of this same 14th century, when the sciences gradually decreased, and were almost entirely extinct, no work of any merit appearing. History now drooped her head, their poetry had no relish, and all other sciences were

enveloped in darkness. The schools began to decay, and in many places they had none at all. It was very uncommon for any one to understand Latin, and few priests could read their breviary and rituals fluently.

But this was not alone the case in Iceland, the greater part of Europe experienced the same change. For the dawn of a brighter day, which had begun to spread from Greece over Italy and the southern part of Europe, after the taking of Constantinople by the Turks in 1453, had not yet penetrated to the north. Whatever bore the name of learning was not only despised; but so gross was their ignorance, that men of the highest rank, both spiritual and temporal, were incapable of writing their names. We cannot wonder at this in Iceland, when the history of the church affords so many examples of bishops who were present at councils, at the conclusion of which they caused to be written under the acts, *quoniam Dominus N. Episcopus scribere nescit, ideo ejus loco subscripsit N. N.* We were also informed, that the
ignorance

ignorance of this age was so great, that scarce any Swedish king before Gustavus I. knew how to write his name. In the annals of *Konungaoch Höfdinga styrelse* (supposed to be written by bishop Brynolf Carlsson, who died at Skara in 1430) it is said, no more ought to be required of a sovereign, than to know how to read, understand, and explain his letters.

The Reformation produced here, as in most places, a new dawn of knowledge. Some time before a printing press had been brought to Iceland, bishop Gissur proposed to open a new school in the convent of Videy, which had been seized by the crown; but as this had been designed for a dwelling-place to the king's receivers of the customs, Christian III. commanded, in the year 1552, that a school-house should be built near each of the cathedral churches; that at Skallholt for forty scholars, and that at Hoolum for thirty-four; but they have since been reduced, the one to thirty-four, and the other to twenty-four scholars. Each of these schools was to be provided

vided with a rector and an assistant teacher; and the king appropriated as much land to these foundations, as was sufficient to afford tolerable salaries to the teachers, and board, books, and cloathing to the scholars gratis, so long as they remained at school.

Great pains have since been taken to appoint men of known abilities as teachers to these schools; and young men are so well instructed there, that few of the clergy study any where else. Many Icelanders, however, study at Copenhagen; and in the year 1773, there were no less than fifty-four at that university, where excellent regulations have been made for the support of poor students. Some likewise study in foreign universities; and between 1760 and 1770 a native of Iceland, Paul Widalin by name, died at Leipzig, who was universally beloved and esteemed there. A Mr. Thorolti, who has been above three years at Upsala, has likewise on all occasions shewn himself a man of great merit.

We should therefore form a very wrong judgment of Iceland, to imagine

gine it absorbed in total ignorance and obscurity : on the contrary, I can affirm, that I have found more knowledge among the lower class, than is to be met with in most other places. You will seldom find a peasant who, besides being well-instructed in the principles of religion, is not also acquainted with the history of his country, which proceeds from the frequent reading of their traditional histories (*sagas*) wherein consists their principal amusement : nor is it uncommon to find persons among them who can repeat the poems of Kolbein, Grimson, Sigurd, Gifles, Gudmund, and Bergthors by heart, all of them poets who flourished in later times ; and among whom Vigfus Jonsson has particularly distinguished himself by his wit, though sometimes at the expence of decency. The clergymen speak Latin well ; and I have found better libraries in many parts of Iceland than could have been expected.

A learned society was erected here, which is spoken of in the preface of the above-mentioned Speculum

lum Regale under the name of Societas invisibilis ; and I was intimately acquainted with the rector Halfdan Ejnaron, and the late fysselman Bjarne Haldorson, who were both members of that society, tho' I believe it does not exist at present. I could mention several whose learning and taste did honour to their country, but I shall only name those who have acquired most fame in the literary world.

Among these the bishop of Skallholt, Dr. Finnur Jonson, deserves the first place ; who, besides many learned writings on the antiquities of Iceland, some of which have been published, has lately presented the public with an ecclesiastical history, in three volumes quarto, replete with information, criticism, and erudition. I was happy in becoming more intimately acquainted with this worthy prelate, who has been bishop ever since 1754, and found no less instruction than pleasure in his company. You may easily conceive how much I wished, at taking leave of him, that his advanced age would permit him to
put

put a finishing stroke to his other works. We have some reason to hope for this at present, as one of his sons, the learned Mr. John Finsson, has lately been appointed his father's assistant and provost.

To this number also belong Halfdan Ejnarsen, rector of the school of Hóllum, who has published the *Speculum Regale*, and is now employed in writing *Historia Literaria Islandiæ*. The provost and minister of Hiardarholt, Gunnar Paulsen, is justly celebrated on account of his great knowledge in ancient poetry. Bjarne Jonson, rector of Skallholt, composes very good Latin verses, and has a dissertation of *Gangdagar* ready for the press. Bjarne Paulsen, in company with Eggert Olofsen, made a journey through Iceland to collect manuscripts and curiosities at the expence of the society of sciences. The lagman Soen Solvefen has published several law-works; as has likewise the vice-lagman Jon Olsson, and the provosts Vigfus Jonsen and Gudlaug Thorgeirson, besides several others.

The professor and counsellor of state, Erichsen, who is not settled in Iceland,

is likewise known on account of many dissertations on antiquities, and is a useful member of the Collegii Magnæani. Arnas Magnäus, Torfeus, and several other Icelanders, have also particularly distinguished themselves for literature in this and the former century. I shall give a fuller account of them in another letter, wherein I propose to treat of the Icelandic antiquities in particular, where I shall also mention those who have peculiarly distinguished themselves in that branch of literature.

The language in Iceland is the same as that formerly spoken in Sweden, Denmark, and Norway, and has preserved itself so pure, that any Icelander understands the most antient traditional history, as easily as we do letters written in the time of Charles IX. The general change, which took place in the northern language during and after the time of Erick of Pomerania, did not extend to Iceland, though some trifling alterations were afterwards made in it in the 15th century, by the introduction of religion and their

trade with the Danes, English, and Germans. Near the coasts some Danish is understood, and some even speak it; nor is it uncommon for a peasant to say, *salve domine, bonus dies, bonus vesper, gratias, proficiat, dominus tecum, vale*. Notwithstanding, I cannot agree with Sperling in considering the language as being more Danish than Icelandic, since not a single word of Danish is understood in the interior parts of the country. The great pleasure they find in reading their traditional histories, has contributed not a little to preserve the language in its purity.

You have yourself treated of its origin in the preface to your Swedish-Gothic Dictionary; and one may form the best judgment of the language from Olof Tryggwasson's and some other historical traditions (Sagas) which have been written in the 11th, 12th, and 13th centuries, when it was in its greatest purity. But as these works are not in every person's hands, I will here insert a copy of the Lord's Prayer as a sample, both as it was expressed

pressed and printed in 1585, and in 1746, which will clearly point out the small change which the language has undergone during a space of near 200 years.

1585.

Fader vor thu sem ert a himnum.
Helgjst nafn thitt. Tilkome thitt
riike. Verde thinn vilie so a jordu
sem a himne. Gief ofs i dag vort
dagligt braud. Og fyrerlat ofs vo-
rar skullder, so em vier fyrerlautum
vorum skulldunautum. Og inleid
ofs ecki i freistne. Helldr frelsa
thu ofs af illu, thuiat thitt er riikit,
maattur og dyrd um allder allda.
Amenn.

1746.

Fader vor thu sem ert a himnum,
helgesst thitt nafn, tilkomme thitt
rike, verde thin vilie, so a jordu
sem a himne. Gief thu ofs i dag
vort daglegt braud, og fyrer gief
ofs vorar skullder, so sem vier fyrer-
giefum vorum skulldunautum, og
innleid ofs ecke i freistne, helldur
frelsa thu ofs fra illu, thuiad thitt
er riiked og maattur og dyrd um
allder allda. Amen.

In regard to the pronunciation, they have four different dialects. Those who dwell on the east side of the country, drawl out their words in pronouncing them, which is not done in other places. On the western side they have many words which are peculiar to that part of the Island; and in Snefiolds Jokul the *aa* is pronounced as *ai*. In the southern part of Iceland *e* is pronounced short before *r* in certain words, as for example in *hvoriger*, *moraudt*, and others, though they are commonly long in other parts. In the northern part of Iceland the words are quite of different genders, as *skur*, which is usually feminine, but there is masculine; and *klara*, masculine, which is there feminine. In South Iceland I have observed the following pronunciation :

A is pronounced au in tha

Aa — au — aara

Ll — dl — gamall

Au — ö — thau

U — ö — upp

Ae — ei — vaere

Ja — iau — hia

M O

O	—	ou	—	moder
Gu	—	guö	—	Gud
Y	—	i	—	fyrer
Aef	—	aep	—	kiaefda

Their alphabet consists of the same letters as ours, except the (th), which character we have lost, together with the pronunciation; the English have yet preserved it, though foreigners find it difficult to pronounce.

We have an Icelandic grammar of Runolph Jonson, printed in 4to at Copenhagen in 1651: it was also printed in Hickefii *Elementa linguarum septentrionalium*, Oxford 1688, and again in his *Thesaurus*, Oxford 1703. But the manuscript of Jonas Magnufens's *Grammatica Islandica*, which you, Sir, possess, is more complete, and deserves to be published, as likewise Eggert Olsen's *Orthographia Islandica*. The most ancient Icelandic dictionary we have is the *Wormii Specimen Lexici Runic*, compiled by Magnus Olaffen, which was published in folio, at Copenhagen, in 1650.

Afterwards Gudmundi Andreae Lexicon Islandicum was published by Resenius at Copenhagen, in quarto, in the year 1683. This was followed by Verelii Index linguae vet. Scytho-Scandicae, which Rudbeck caused to be printed in folio, at Upsala, 1691, and by two Lexica Latina Islandica, both published in quarto at Copenhagen, the one in 1734, and the other in 1738; to these Rugman's Monosyllaba Islandica Lat. Explicata, Upsala, 1676, in octavo, may be added. In the library at Upsala was a copy of a manuscript Lexicon Isl. Lat. which I have brought with me from Iceland. In the Antiquity Archives is likewise a very ample work of Gudmundr Olaffen, which has been augmented and reduced to order by Mr. Assessor Gagnerus, which will however most probably never be printed for want of a publisher. It is to be lamented that Runolph Jonson never was able to publish his Lexicon Islandicum, though a privilege was granted him for that purpose in May 1650: we may however soon expect to have something

more perfect on this subject, as the Collegium Magnaeum in Copenhagen have promised to continue the important indexes, with which they have supplied the *Kristniss* and *Gunlaug Ormstunga* Sagas.

L E T T E R

L E T T E R X V.

T O C H E V A L I E R I H R E.

Of Printing in Iceland.

Stockholm, Sept. 12, 1774.

I HAVE said in my last letter that the art of printing was introduced in Iceland a short time before the Reformation. But as many may be surprized that books were printed there so early, I shall endeavour to treat more at large in this of the different printing-offices in Iceland.

One of the most famous, but at the same time most illiterate and turbulent bishops in Iceland, was John Areson, bishop of Hoolum. He made use of many arts, and particularly of his zeal for the Roman Catholic religion, to undermine the king's power, and hinder the progress of the reformation. His plots however succeeded so ill, that he was beheaded in 1550. As this man was extremely ignorant,

and had not the least knowledge of the Latin language, which was however made use of in letters of excommunication, and other ordinances, he commissioned a friend to procure him a person well versed in Latin, who might at the same time establish a printing-office. For this purpose John Mathieffon, a native of Sweden, was recommended to him, and he arrived in Iceland between 1527 and 1530.

I cannot determine with certainty whether he was in orders at his arrival in Iceland; however I am inclined to believe it, from the appellation of Sira being given him after his arrival, which is a term applicable to the clergy. The bishop immediately appointed him to the prebendary of Bridebolstad and Vesturhopi, which situation he enjoyed till his death in 1567, when at a very advanced age. Besides several other children he left a son whose name was John, who was a printer there in the time of bishop Guthrandr: he was succeeded in the printing-office by his son Brandur.

John

John Bradtson, son of the latter, died in an advanced age in 1681, as provost of Hytarnas. His son John Johnson, a clergyman, died in the same place in 1732. This whole family is now reduced to poverty.

The printing-office was immediately established; and in 1531 John Mathieson printed the first book in Iceland, which was the Breviarium Nidarosienſe. There was likewise an edition of this book printed at Dronthiem, the editor of which was archbishop Erick Walkendorf, which is now very scarce. I do not remember to have ſeen this edition mentioned any where, except in the 28th number of the Daniſh Magazine, where a copy of it is ſaid to be in the library of Mr. Klevenfeldt. But in regard to the Icelandic edition, it is generally believed, that not a ſingle copy of it remains, ſince the only one I ever heard of was in Arnas Magnæi's library, which was conſumed in the fire at Copenhagen in 1728.

Befides the Breviarium Nidarosienſe, he printed the *Handbok Præſta* (an Eccle-

siaftical Manual) Luther's Catechifm, and other books of the fame fort. Printing however did not go on very well till 1574, when bifhop Guthrandr Thorlakfon ordered new types to be brought thither; whereupon, amongft other books, the Icelandic bible appeared in print in folio, in the year 1584. The printing-office was at this period fo well provided with types, that two preffes were employed, exclusive of thofe at Hoolum, where feveral books were printed and published about that time. The Icelandic code of laws was printed in 1578, at Nupufell, twelve miles from Hoolum, as likewise the Viti Theodori Summaria in 1589.

The printing-office at Hoolum was taken from Thord Thorlakfon, in 1685, and transferred to Skallholt; where one-and-forty different books were printed: the firft of which was *Paradyfan Lykell*, likewise *Forfadra Bok* in 1686; and the laft, *Boenabok Sira Thordar Bardarfonar Med Vika Saung Olearii, utl. af Sira Steines*

Steines in 1697. But in the beginning of this century, the printing-office was again removed to Hoolum, after bishop Bjorn Thorleiffson had bought it, together with the privileges granted to it, for five hundred dollars; and the first book published on the revival of printing at this place, was the *Paraphrasis Medit.* Dr. John Gerhardi, 1703. Since this time, some historical books, among which I will mention the life of Gustavus Landkrona, published at Hoolum in 8vo, 1756, translated from the Swedish into the Icelandic language, have always been published here; the greatest part of them however are religious books. A new privileged printing-office has likewise lately been established at Hrappsey, by Olafr Olssen, where several valuable books have already been printed.

A list of Icelandic books might perhaps not be improper in this place; but as I am unable to furnish you with a complete one, I did not think it worth while to send you a catalogue
of

of about three hundred that I am acquainted with; of which number however I am happy to have upwards of one hundred now in my library.

LETTER

L E T T E R XVI.

To CHEVALIER IHRE.

Of the Remains of Antiquity in Iceland.

Stockholm, Dec. 21, 1774.

Dear Sir,

HOW infinitely happy should I be, were I able to satisfy your curiosity in respect to the great number of remarkable and ancient monuments with which Iceland is supposed to abound: but this is out of my power; all the information I can give you amounts to no more than that the country is so destitute of them, that it is in vain to go in search of any antiquities deserving the least notice. There are however some ruins of an old castle near Videdal, which was formerly about two hundred perches in circumference; the remains on the north side are about twenty fathoms

fathoms in height, though they are very low toward the south. Near the parsonage Skaggestad, at Laugernas, are likewise some ruins of a lesser castle, but it is not known by whom, or when it was built. In other places are remains of Heathen Temples, viz. at Midfiord, Godale, Vidvik, and others: at Hegranas is a kind of ancient place of execution; there are also several burying-places from the times of Paganism, among which I shall only mention Thorleif Jarlaskalds, situate on a small island in the Oxaraa. Some old swords and helmets have likewise been found, but they have not cleared up any part of history. On the heaths of Thingmans and Threkylis are two great stones standing upright, which most probably have been erected as monuments to the memory of some deceased persons, according to Odin's regulation. This custom, which was long practised in the North, has from thence been brought to Iceland; though it was not usual in Sweden till a long time after to put any inscription on the monu-

monument. I have been told, that some years ago, forty small figures of brass were found in the ground near Flatey, representing animals and other objects; but unfortunately they fell into the hands of people who did not know their value, consequently they have been all lost.

There are no other monuments remaining of Sturleson, besides his writings, but a mount over-grown with grass at Reikholt, which is said to have been raised from the ruins of his house; *Sturlunga Reitur*, the burying-place of his family; and at a little distance from them, *Snorra Laug*, one of the finest baths in Iceland. This bath, which is large enough to contain 50 persons at one time, is mured in with a wall of basalt, and concreto thermarum; it has a smooth level bottom, and is surrounded with benches. In Sturleson's time a long covered passage led from thence to the dwelling-house, so that the bathers retire from the bath without being exposed to the cold. The spring is at forty paces distance, and is called *Scribla*,

Scribla, and the water from it is conveyed to the bath through a conduit made of stones. At the end of this conduit is a hole in a rock, which is shut with a spigot and faucet, and through which you let in as much warm water as you think fit; this, when too hot, may easily be cooled by water from an adjoining brook.

These are almost the only ancient monuments Iceland affords, and all, as you will readily allow, are of very little importance. There are no ancient manuscripts, Icelandic sagas, or historical traditions or accounts, to be met with, the island having been entirely stripped of them, owing to the zeal and industry of the antiquarians and others, who formerly resorted in numbers to this country, for the sole end of collecting them.

The honour of having first begun to collect them belongs to Sweden: the first who undertook it was Jonas Rugman, who went to Iceland in 1661, at the expence of the court of Sweden, where he obtained a number of manuscripts, which laid the foundation for the collection of Icelandic original records,
that

that are contained in the Swedish archives of antiquities. Encouraged by his example, Thormundr Thorvifson likewise went to Iceland, furnished with an order from king Frederic the Third, of the 27th of May 1662, to the bishops Bryniolf, Svenffon, and Gifle Thorlakfon, to affist him in collecting Icelandic manuscripts.

After the establishment of the college it was proposed to fend Peter Salan to Iceland; but this did not take place, though they gained their point some time after, in 1680, by means of Gudmundr Olson, who prevailed upon his brother Helge Olson to leave Iceland and come to Sweden, whither he brought a considerable number of manuscripts. Great additions were afterwards made to these collections by Arngrim Johnson, Jonas Wigfusen, Lopt Josephen, Gudmund Gudmunderfon, and Thorvaldr Brockman, who were all employed as translators by the college of antiquities. Jonas Eghardsen, Magnus Benedicfsen, Ifleif Thorleiffen, Ejnar Ejnarsen, Arnas Hakanfen, Francis Jacobsen, and Thord

Thord Thorlakson have also very much enriched the collection, both when the college of antiquities was at Upsala, and when it was afterwards transferred to Stockholm.

The attention of the Danish court was at last excited: king Christian the Fifth, in 1685, dispatched Thomas Bartholin to Iceland with an order to the bailiff Heidemann, to assist him in collecting Icelandic antiquities: he forbid at the same time, in the strictest manner, any manuscripts, histories, or other accounts relating to Iceland, to be sold to foreigners, or carried out of the country.

Stockholm, as well as Copenhagen, became therefore possess of a considerable number of Icelandic writings; but the latter court not satisfied with what they had already obtained, dispatched Arnas Magnäus and Paul Widalin to Iceland in 1712; where they sought for whatever might remain there with such extreme care, that it is almost impossible to get sight of any manuscript history in the whole country; and notwithstanding the pains
I have

have taken, I could only obtain an imperfect copy of the Sturlunga Saga, which I purchased.

It is in vain, therefore, that one now enquires for ancient Icelandic chronicles in Iceland; for besides the fine collection in the Swedish archives of antiquities, there is a very admirable collection of them in the library of the academy at Copenhagen, which was a gift of Arnas Magnäus; besides several small collections of less importance in the hands of private persons.

I have already mentioned the Icelandic histories which have been published: some of them have been printed in Iceland, among which those printed at Skallholt are very rare; but the greatest part have been published in Sweden, though sometimes from very imperfect manuscripts. Olof Rudbeck the elder, Verelius, the two Peringskolds, Renhielm, Biorner, Salan, and Brokman, have however acquired a great deal of merit by the care and diligence which they

N bestowed

bestowed upon them. None of these editions however can be compared, in point of elegance and criticism, to those published in Copenhagen, by the Magnäanian College, the continuation of which is expected with great impatience by the literary world.

L E T T E R XVII.

TO BARON AXEL LEJONHUFWUD.

Of the Icelandic Poetry.

Stockholm, Dec. 12, 1775.

IT is with the utmost pleasure that I prepare to obey your commands, in communicating to you a short account of the Icelandic poetry; I only lament that my circumscribed knowledge on a subject which is surrounded with so many obscurities, will not permit me to make my account as perfect as I could wish, and as the importance of the subject requires; I regret this inability so much the more, as I am to submit my thoughts to the eye of so great a connoisseur; but if even my observations should not be very important, I will console myself for it, as they will, however, be a proof of my readiness to comply with your wishes.

Though the opinion of some men of learning, that writing in verse has been earlier practised in Europe than writing in prose, may appear extraordinary at first, yet it seems more probable upon nearer examination. The poets among the Greeks and Romans were more ancient than their historians and most celebrated orators. The time when prose first began to be written among these nations, may be ascertained with tolerable accuracy; but it is almost impossible to determine the age of poetry among them, as it is far more ancient than the siege of Troy and the Olympic games. In the same manner we know that the first work in prose among the Romans was the speech of Appius Caegius, to the senate and Roman people in the 125th Olympiad; in which he advises them to refuse the conditions of peace offered by Pyrrhus, when it is certain that poetry had been known and cultivated among them long before.

This need not be wondered at, when we recollect that long before the know-
 2 ledge

ledge of letters could have become general in Europe, many actions might, however, have been thought worthy to be consigned to posterity. How great an assistance must it have been to the memory, when the remembrance of an event, destined to be rescued from oblivion, was preserved in words, composed according to a certain measure, where it might be determined, even by the ear alone, if any word had been omitted or altered. The laws of the ancient Germans were written in verse, and the stanzas in which they were composed were generally sung. The French monarch, induced by the favourable reception given to every poetical work, caused the Bible to be translated into verse in the ninth century : from the same motive Ottfried, a Benedictine monk in Alsace, translated the four Evangelists into German verse about the same period.

Thus we see that poetry is extremely ancient among all nations ; and in Sweden it may be considered as a legacy

of Odin, who first brought it thither. In ancient times there was no king or chief, or any other man of note, who had not his own *skald* or poet, who was obliged to be present on all important occasions, to remark whatever was worthy of attention, and to relate it in songs. He was present at battles in the *Skoldborg*, or in the midst of the bravest warriors, that he might behold with his own eyes those actions which were to be recorded: at their banquets he was obliged to animate the guests with happy inventions and poetical encomiums on their deceased heroes. These poets were every where held in high esteem; they were constantly admitted to the king's presence, and frequently were both his generals and ministers. They were called *skaldr*, which Chevalier Ihre derives from *skial*, reason or prudence, from whence the expression of *skiálamán*, wise men. They were likewise called *spekingr*, from *speke*, wisdom, from whence the English word to Speak, derives its origin.

To

To the songs of these poets we owe the first accounts of the Swedish history, and cannot therefore deprive them of the honour Tacitus bestows on them in calling them *Antiquissimum annalium genus*. Our ancient traditions are likewise filled with these songs, which we cannot alter or reject as worthless, though they are, for the most part, unintelligible to us. The cause of this is, first, that the Skalds purposely composed their songs with so much art, that they were not only unintelligible to the vulgar, of which we find examples in Geila Stursonar, Viga Glum, and Greltis's Sagas; but they were not even understood by the greatest poets, of which Gretter's history gives us a proof.

They were, secondly, accustomed to transpose the order of the words in their songs in so strange a manner, as necessarily augmented the obscurity. I will only mention one example of this from Renhjelm, where the words, to follow in their natural order, ought to have

been ranged according to the number placed over them :

1 2 8 9
Hilmir vann at holmi

5 7 6
Hialm-skoth rothni blothi

3 14 15 13
Huat ofduldu thess hoeldar

4 10 11 12
Hoerd oc austur i goerthom

18 20 17 19
Rogs bra Recka laegir

10 22 21
Riikur valkera lijki

23 24 27
Herstefnir let brofnum

25 26 28
Hold flaemingia goldit.

They had, thirdly, a particular poetical language (*Skaldskaparmal*) which was very copious, but could not be made use of in common life. This language probably made one of the principal parts of their studies in those times, as they were not insensible

sible of its beauty and elegance. Thus for example, there are upwards of fifty sononymes of the word *bölja*, billow or wave. And Chevalier Ihre quotes Lopt Guttormson's Lyodalykil (a love-song) in which there are many different appellations, which all express the word woman. I shall borrow a few lines of this poem, which are mentioned in the Edda among the *kringaheiti*, and which prove how far these poets went in their Antonomafias.

Heingi eg hamri kringdan
 Hang a riupu tangar.
 Grimnis fylgs a galga
 Gynnung bruar linna.

The natural disposition of these words is this : *Eg heingi hamri kringdan linna gynnung a hang riupu bruar tangar, a Grymnis fylgs galga* ; which means, I hang the round beaten gaping snake on the end of the bridge of the mountain bird, at the gallows of Odin's Shield. To find the sense of these words, Mr. Ihre observes, that by the gallows of Odin's Shield is meant the arm,

arm, on which it is usual to hang on the shield. By the word *ripa* is understood a falcon; for a Skald has the permission of putting one genus for another. The bridge of the falcon is the hand, on which the falconer places him, and its end or tong (tongue) is the finger. The gaping round beaten snake means a ring; and consequently this long story means no more than, I put a ring on my finger.

Fourthly, to make themselves still more intelligible, when two words had the same sound, the Skalds were allowed the liberty of putting the periphrasis of the one for the other: for example, the word *hof* signifies a horse's hoof or foot; but the same word likewise means decency, moderation, understanding; and to express this the horse's hoof was frequently made use of. But the principal difficulty in the explanation of this ancient poetry proceeds from the extreme incorrectness of the manuscripts of our Sagas, particularly of the poetry, which cannot be read correctly without great attention. These are the causes why the greater
part

part of the verses in their Sagas, published either in Iceland itself or in Sweden, cannot be understood ; only very few are capable of comprehending them ; that it is however possible, is proved by the new editions of *Kristnis Saga*, *Landnamabok*, and several others. The provost Gunnar Paulsen in Iceland is particularly distinguished for his great knowledge in this branch of literature.

The difficulties we meet with in ascertaining the true sense of these ancient poems, is likewise the cause of the contempt with which we consider these few remains of the genius of the ancients. I will readily acknowledge that they have no poem which could be proposed as a pattern of wit and elegance ; yet it cannot be denied, but that very sublime thoughts and expressions, and sometimes very beautiful comparisons, are to be met with in them : and it is impossible to read the dying *Lodbrok's Biarkamal*, *Eigils*, *Hofud*, *Lausn*, and *Ejvindrs*, *Hacornarma*, without pleasure, besides several others.

They

They chose for the subject of their poetry whatever happened in common life; however they principally occupied themselves in composing songs in praise of the actions of their great men; in which they are accused of not being over scrupulous in bestowing their flatteries. We have several poems existing on various subjects, among which there is a tolerable epic one on Charles and Grim, besides another on Hialmar. They have likewise some satirical pieces, which they used to call *nidvisor*, and the undertaking of the author was named *yrkia nid*; but there are no traces of their having had the least idea of theatrical performances.

From what has been said, it may be imagined that there is no language which allows a poet so much liberty as the Icelandic; and indeed there is no language so rich in poetical expressions as this: it must not however be thought that it is confined by certain rules: on the contrary, I believe there is no prosody so copious as the Icelandic, as, according to
the

the Edda, they had no less than 136 different sorts of versifications (in Icelandic *battur*) each of which had its particular rules. However it will be extremely difficult, nay almost impossible, to say any thing certain on this subject, before we have a true explanation of that part which treats of it in the third volume of the Edda.

The Edda is one of the most celebrated remains of antiquity, and yet it has hitherto been very imperfectly known. It has generally been considered as the mythology of the ancients, and the *Voluspá* and *Havamal* have been forced upon it, as two of its volumes, though they do not in the least belong to it. But Chevalier Ihre has thrown more light on this affair: in his printed letter to Mr. Lagerbring, he has attentively examined the manuscript of the Edda, in the library at Upsala, and clearly proves that it is nothing more than an introduction to Icelandic poetry, consisting of three parts: the first, *daemifagor*, is an extract from the *Historia mythica veterum*

rum: the second, *kenningar*, is a mere *Ærarium poeticum*; and the third, *liods greiner*, contains the Icelandic prosody, &c. &c. The so-called *dæmisagorne*, are for the most part translated into the Swedish language by Goranson, but the translation is very incorrect. Resenius has likewise published them, together with the *Kenningarne* in Latin. But the third part, which deserves no less attention, has not yet appeared in print; and it is much to be wished that Chevalier Ihre would give it to the public, as there are so few besides himself capable of doing it justice.

The various conjectures which have been formed concerning the true author of the Edda, have been no less erroneous than those relating to the subject of the book itself. It has generally been thought that Samundr Sigfuson, who died in 1133, wrote a very ample work, entitled the Edda, which treated of many important subjects, and was in a manner a magazine of all human knowledge; of which however scarce one

third has ever been preserved, and transmitted to us in the present Edda. But Chevalier Ihre asserts, that the Edda we now are in possession of, has not been extracted from any one more ancient, but that it has originally been composed by Snorre Sturleson.

The difficulties and objections which have been made against this opinion by the learned Arnas Magnäus, and afterwards by professor Schloßern, can easily be removed; for most probably Sturleson's Edda has been continued by the monk Gunlaug, as Bjorn of Skardsaa supposes, or rather by Olaf Hvitaskald. It is not therefore surprizing, that something in praise of Sturleson should inserted; and it may easily be explained from hence, why the author called Walde-mar king of Denmark, his master.

It is difficult to determine the true nature of the ancient Icelandic poetry; however to give you some idea of it, I will say something of the versification most frequently used among them, and

and which was called *drottquæde* (king's song).

It was divided into stanzas, each of which consisted of four couplets, and each of these couplets was again composed of two hemisticks, of which every one contained six syllables: and it was not allowed to augment this number, except in cases of the greatest necessity. These syllables consist of three or four feet, according to the different sorts of versification, and sometimes of more, in proportion to the shortness of the syllables. Besides this, the Icelandic poetry requires two other things, viz. words with the same initial letters, and words of the same sound. This assonance is called *hending*, and is either more or less; in the first case it is called *adalhending*, and in the second, *skotthending*. This you may clearly see by the following example:

Austur londum for undann
 Alvaldur fa er gaf scaldum,
 Hann feck gagn at gunne,
 Gunntrör da flög mærgum,
 Slydur-

Slydurtungur let slingra
 Sverd leiks reigenn ferdar,
 Sende grammur ad grundu
 Gullwarpathi snarpann.

Here it must first be observed, that there is in every couplet a syllable which governs the whole verse, *rader quædinni*, which is almost always the first word in the second hemistich; and two words in the first hemistich must begin with the same letter, if it is a consonant; but when it is a vowel, one vowel may be put for another. Thus, for example, in the above stanza the following words are those which govern each verse, consisting of two lines or hemistichs, *radar quedandi*, in the first verse, the word *alvadur*, because it begins with a vowel, has, in the first hemistich of this verse, the words *austur* and *undann*; in the second verse *gunhörda*, you find *gagn* and *gunne* in its first half; in the third verse *sverd*, whence in the first hemistich *slydurtungur* and *slingra*; in the fourth verse, *gullvarpathi*, which requires *gramur* and

O

and *grundu* in its first half. Secondly, one finds in the first hemistich of each verse a *skotthending*, or two words, which have equal consonants with unequal vowels, such as are in the first verse, *löndum*, *undann*; in the second *bann*, *gunn*; in the third, *slydur-tungur*, *slingra*; and in the fourth, *sende*, *grundu*. But in the second hemistich of each verse is an *adalhending*, where two words have both equal consonants and vowels, in the above-mentioned stanza: words of this kind are in the first verse *alvald*, *skaldumm*; in the second verse *gunhörda*, *mörgum*; in third verse *sverd*, *ferdar*; and in the fourth verse *gulvarpathi*, *snarpann*; consequently in a stanza, which, like the above, consists of thirty words, above one half of its peculiar properties are contained in the impossibility of changing one word for another, or transposing it, without making a great alteration in the whole verse. These assonances, or *hendingars*, are generally found in the first and last word of each line: sometimes however the one assonant word is placed in the middle

middle of the line, as in the instance of the word *lōndum* in the first hemistich of the first verse.

This consonance of sounds must be considered as the necessary ornament of a regular verse by the ancient Skalds: the greater this uniformity is, the more the verse approaches to perfection; it likewise serves them as a guide in singing their verses. We also find something of this sort in the Latin poets: Virgil says,

—tales casus Cassandra canebat.

And another poet,

Dum dubitat natura marem faceretve
puellam,
Nates es o pulcher paene puella puer.

This has likewise been remarked by Boethius, who at the same time quotes from Giraldus Cambrensis, that this was also customary among the ancient Cambrians, and in England: so that it seems to have been the opinion of most nations, that the elegance of

poetry required this harmony of
sounds. For this reason the Cambrians
say,

Digawn Duw da y unie
Wrth bob ctybwylh parawd.

And the English,

God is together gamman and wif-
dome.

David Rhaefus confirms this in his
Grammatica Cambro-Brytannica, prin-
ted in folio, London 1592, and quotes
several passages from their verses,
which have a great deal of resemblance
with the *hendingar* of the Icelanders.

I know not whether the agreement
of the initial letters, customary in the
poetry of the Finlanders, might not
likewise be mentioned here, as a proof
of the same custom being observed
there as in Iceland: I will therefore
insert a passage from Calamni's Con-
gratulation to the late king Adolphus
Frederic, on his undertaking a voyage
to Finland.

Koſta

Kosta kulki kuningamme
 Adolph Fredric armollinen
 Meidan maalla matkusteli,
 Kaicki vereni venahti,
 Kaicki lükahti lihani,
 Eltae virteni viritin,
 Kannoin minum kandeleni,
 Haen istuimen etehen,
 Kaicki vallan kamarihin :
 Iosta anvin andimia.

But this carries me too far from my subject. Though we do not find any rhymes in our most ancient poetry, it may, however, be said with certainty that they are older than the introduction of the Christian religion. Skule Ejnarson is therefore wrongfully accused of having introduced the use of rhymes, which is now become so general, that except England, which has preserved its blank verse, no nation in Europe is pleased with verses that do not rhyme. The art of rhyming, which is by no means essential to poetry, and still less useful, as it only serves to make it more difficult, was borrowed, it is not improbable, from the

ancient northern skalds, and has now spread itself beyond Europe ; so that rhyming is become as universal as the complaint, that the number of versifiers increases in the same proportion as the number of poets decreases. Baretti relates, that he heard a Mosambique song in rhyme, from some Negroes at Madrid. Gages says the same of the Mexicans ; and Nixbuhr mentions that the Arabs are great rhymers.

To conclude, I here present you with a specimen of an Icelandic poem which Rugman composed on the death of count Magnus de la Gardia. It was printed at Upsala ; but is become so scarce, that I doubt whether any person in Sweden has a printed copy of it : it may at the same time serve to shew the nature of a *drottquade*, as the author has observed almost all the rules which constitute one.

Aut er i seggia föti
Saknar manns i ranni

Gret

Gret ylgur Ragnvald rytto
 Rom-flamir haukar fromast
 Kund Lodbrokar; kiendo
 Kuillinda valir illra :
 Kuóldrido klarar hreldost
 Kueid ari már fast reidar
 Tijd fiello tar af giodi
 Tafnlausir æpto hrafnar.

Thuarr og vid theingils dauda
 Thydur morg brád, i hijdi
 Skreidaft thui berfi skiædur
 Skiott marti gráds, of otta :
 Ox ódum falu faxes
 Frar miog or leiptri tara
 Huarma bekkur ad brockin
 Hraut gron a baudar nauti.

Greto skinlaus agiætann
 Gripdijr heidingia fuipuls
 Verdar of fædo fórdum
 Fleinthings allvakran kingia :
 Og i oglodum huga
 Undo fier menn og hrundir
 Seims kuado mundar foma
 Sieirrhvor huit malar thuerri.

Heidingiar ef sua hedins
 Harmadu kuanar barma
 Stálir fier giordi stala
 Stjrir og Eida hiruft :
 Thars i malmgufti giera
 Grad thuarr og vod til brada
 Varga kna vund oborgid
 Vas, thaut rafn i afi.

Hvad bæri ofs er erum
 Urdarbrunns tha alkunnir
 Sira Jofurs thefs fara
 Sueita dagliga neitum ?
 Og i hans erum faugru
 Orda vidkuædi vordnir
 Uppfræddir ad vier hreppa
 Aftundum gledi háá ?

Bæri ofs ey bliugum vera
 Breifkleika holdfins veikan
 Tijtt fyri fionir settia
 Synd flya, dygd i nijast ?
 Hel med thui hroka stoli
 Hreikir fier a faul bleikum
 Akuedr ymfra thioda
 Andlat med quifti handar.

Hel vægir hauldum eigi
 Hrífur or thesso lífi
 Kejsara, Klerk og Ráfir
 Karlmenfko fulla Jarla ;
 Altignum amint fagnar
 Og kot-af-röpa throti
 Kurteifa kappa herfa
 Kielling leggur ad velli.

Dæmi framm daglig koma
 Drijir hel verk at nijo
 Audlinga aburt leidir
 Ofi dauggvar tara fossi :
 Mannlunga mætsta fangar
 Med fier hertekna hiedan
 Færir og furdum 'ftorum
 Fiaurlestir meingid befta.

Sidpridi, fæmd og heidur,
 Somligur dygdar blomi,
 Mangiæfka, vinfæl minning,
 Metrda fremd ofgietin,
 Frijdleikur, fegurd, audur,
 Frækn, aft, og hyller dáfto
 Hel med fier dregur i duala
 Deyr tho gott mannord eije.

Einn nu af æfi banni
 Afgieck raud moens brecku
 Mætur altygin ytum
 Æ tregandi lægir:
 Kurreis, vis, kiænn, til vurtu
 Kin-ſtor lof dunga vinur
 Haborin Jarl og Herra
 Haukſtandar malar grandí.

Dyr Magnus Delagardi
 Dygdhár Odains bygde
 Akurs víft af var rekin,
 Er nara nift illſkiptin:
 Mord hauxa fall hans færði
 Fridoftum brecko hlíjda
 Sorg ſtora ſua og morgum
 Slædir lax hrundum fædo.

Thar fie ofs tho ad eyrir
 Thad hann í gudi gládur
 Als træd holds goto greida
 Grand fyrtiſt vondra anda;
 Hirdur í Gimlis gardi
 Glatt fingur og ſamklingir
 Utvauldum Eingla ſueitum
 Endalaufi lof miuk rauſto.

EPITAPHIUM.

Conditur hoc tumulo juvenili mor-
tuus ævo

Magnus, de Magna Gardia gente
fatus.

In multos canus dignus qui viveret
annos,

Hei mihi! quod juvenis concidit ante
diem.

Hujus enim ingenium cepit non terra.
Quid inde?

Tollite Cælicolæ, reddite Cælicolæ.
Dic tumulum spectans oculo properante
viator;

Magno Tuo Cineri fit pia terra levis.

Scripsit Upsalæ anno 1667,
die 14 Februarii.

JONAS RUGMAN.

L E T-

LETTER XVIII.

To Professor BERGMANN.

Of the Volcanos in Iceland.

Stockholm, Sept. 1, 1773.

HAVING received the collection I made in Iceland of the specimens of the different substances of which their volcanos are composed, I take the liberty of sending it to you; adding at the same time a short account of these burning mountains, which is in part extracted from Icelandic writers, and partly founded on what I heard from the natives, as well as from my own observations; and which I do not think unworthy of your closer examination. Indeed it is much to be lamented, that since of late such care and application have been bestowed on the study of natural history, so little attention has been paid to the operations of Nature in this remarkable island; for
hitherto

hitherto a very small number of the many volcanos are yet fully known ; but that we should be more ignorant in regard to the wonderful hot spouting water-springs with which the country abounds, is very extraordinary ; not to mention many other uncommon appearances in Nature.

My time and attention have been too much confined and taken up to give you so complete an account of the curiosities of Iceland as they deserve ; but I flatter myself notwithstanding, that you will give a favourable reception to the few observations I shall make, though they should not be so important as might be expected. We may hope to see this subject treated upon more at large, when you have time and opportunity to compare the effects of fire in Iceland, with similar ones in other parts of the world.

I will not venture to determine how far the opinion of some men of learning is founded on truth, that all mountains have taken their rise either from fire or water. How probable

probable soever this opinion may appear, of which we can find no traces in the most remote times, and the most ancient authors ; yet it would be very difficult, nay almost impossible, to establish it by experience : but be this as it may, I will venture to pronounce, that Iceland has been formed by eruptions of fire.

It is no uncommon event for islands to be produced in this manner ; we have many examples of it ; but the size and extent of Iceland, in comparison to other islands, which owe their origin to the same cause, may raise some doubts against the reception of this hypothesis. Nor can it be denied, that this, as well as several sorts of stone which are to be found there, and which do not bear any distinct marks of the effects of fire, are likewise calculated to confirm these doubts. Again, I see nothing to hinder me from considering Iceland as produced by fire, when I reflect that the ground in all parts of the island, and particularly near the sea shore, consists of *lava* or *tuffa*, which is frequently covered

vered with other sorts of stones, as at Lundö, and even with a hard kind of moor-stone (*saxum*) or with several strata of different kinds of earth and stone, as at Laugarnœs, where the lava is fourteen feet in depth; when I find besides, that those rocks which have no traces of fire are compounded of sand mixed with small pieces of spar, which may easily be produced, in two or three thousand years, since the lava has laid the foundation; I am still more inclined to support this opinion.

I am not however so credulous as to believe, that the whole island was produced at once by fire; but I rather conjecture that it has been the work of some centuries, by several cliffs and rocks having been produced at different times, whose points have been connected by new eruptions, and which have formed the basis of the whole island.

It is very difficult to determine, whether this supposition has any real foundation or not; however I think myself authorized to believe it, as well
from

from the arched figure into which the streams of lava have generally formed themselves, as from the probable connections of the sea and the volcanos there: I likewise believe, that from hence it may best be explained, why several islands have been swallowed up in great earthquakes, as a building may soonest be destroyed by tearing away the pillars on which it rests.

Thus I go further back with regard to the eruptions of fire in Iceland, than the common tradition among the vulgar people there, who believe that the first inhabitants of the country, whom they suppose to have been Christians and Irishmen, were so much oppressed by the Norwegian Colonists, that they were forced to leave the country, which they first set fire to, to revenge themselves. We cannot however determine, till after the arrival of the Norwegians, how often the eruptions of fire have happened. But this nation has preserved with great care whatever concerned their place of residence or habitation.

The first eruption of fire, mentioned by the antient records, is the *Ildbor-gar braun*, immediately after the arrival of the Norwegians on the west side of the island, in the ninth century. But it is not remarked as any thing extraordinary, only that the fire broke out near a farm belonging to Thore; and a stretch of lava, or a *braun*, of three miles in length, and two and a half in breadth, remains to this day as a monument of it. After this there are no eruptions mentioned till the year 1000, when the Christian religion was introduced there. At a time when the chiefs of the country were assembled, to consult about the reception of the Christian religion, information was brought that fire was thrown out at Plow. The Heathens considered this as a proof of the wrath of their gods, on which account they were resolved to refuse the new religion; but this resolution was overruled by Snorre Gode's asking them, "On whom did the gods display
 " their wrath, when those rocks on
 " which we now stand were on fire?"

The Icelandic Chronicles mention many instances of fiery eruptions observed in different places during the space of 800 years*; it is therefore difficult to conceive how Horrebow, who has been in the country himself, could affirm, that fire is emitted only from them very rarely, and in few places.

To be sensible of the dreadful effects of fire, the country itself need only be considered. The mountains are almost entirely composed of lava and *tuffa*, and the plains are crusted over with *braun*, or tracts of lava, which are, however, in many places covered with earth or turf. The accounts which we have of certain eruptions of fire, also inform us, that they have always laid waste large tracts of land, either more or less.

I will not in this place mention the damages done to the inhabitants by the ashes thrown from the volcanos, which frequently covered the fields for

* The Chronicles give a list of 63 eruptions at Heckla and other places, from the year 1000 to 1766; of which twenty-three were eruptions of Mount Heckla only.

a space of twenty or thirty miles in length, and half a yard in height, and by which the cattle suffered very much, as it caused them to lose their teeth, and frequently to drop down dead for want of food; and when they have been killed, pumice has sometimes been found in their liver and bowels. I will only name some of the places situate nearest to the volcanos, that have been utterly destroyed by their effects. This has been partly done by violent earthquakes, which generally preceded the eruption; and partly by inundations of water from the ice melted by the fire; and lastly, by the quantity of glowing ashes and stones thrown from the mouths of the volcanos, and the streams of burning matter which flowed down on all sides.

In 1311 eleven farms were consumed near Roidekamb, and as many more near Tolledyngr; and in 1366, 70 at Lillehered. Heckla destroyed two in 1374; seven in 1390; and 18 in one day in 1436. In the same man-

ner five farms were laid waste near Myrdals Jokul in 1660, and still more in 1693 near Heckla. In 1727, at least 600 sheep and 150 horses were killed near Myrdals Jokul, by the flood and the pieces of ice which rushed down with it. In 1728, many farms were destroyed near Krafle, and a large lake called Myvatn, was entirely dried up, into which the streams of fire that rolled from the mountains, flowed during some years, and formed a tract of lava of four miles in length, and one and a half in breadth. In 1755 Kattlegiaa laid waste six parishes; and in the same year the last eruption of Heckla ravaged a tract many miles to the north-east.

It is not therefore to be doubted, but that the fire rages here with as much, and perhaps more violence than Vesuvius, Ætna, and other volcanos; notwithstanding which, I see no foundation for the opinion of some people, who affirm that there is a communication between the volcanos of Iceland and Italy; it might be maintained with as much foundation that Kattlegiaa and Teneriff,

Teneriff, or Krafle and Lima, communicate.

But before I quit this subject I will mention a circumstance which is related both by Egbert Olafsen and Jacobsen. The last time that Kattlegiaa emitted fire, a flash of lightning, as it were, burst from the flame, and pierced through the cliffs which intercepted its way. The same lightning in one place killed eleven horses, three of which were in a stable; a farmer was also killed by it near the door of his room; his upper cloaths, which were woollen, remained entirely unhurt, but his shirt and waistcoat, which were both of linen, were burnt; and when his cloaths were pulled off, it was found that the flesh and skin on the right side were consumed to the very bones. The maid-servant, who wanted to assist him in saving the cattle, was likewise struck by the lightning, but did not die till several days after, during which time she suffered inexpressible torture. It is likewise said, that when she put on her cloaths, they were singed by the glutinous fires, which

cleaved to her body. At first, I hesitated to receive this as true, but when I read in your Cosmography, that Braccini had observed in 1631, that a column of smoak from Vesuvius extended over several miles of the country, from which deadly lightning proceeded ; and that the same happened in 1767, when the iron rods erected in Naples became electric whenever Vesuvius emitted fire ; I am the more inclined to believe that there is something electrical in this kind of fire, as the same phenomena appear in thunder and lightning.

LETTER

LETTER XIX.

TO PROFESSOR BERGMAN.

Of the Volcanos in Iceland.

Stockholm, Sep. 21, 1774.

IT scarcely ever happens that the mountains begin to throw out fire unexpectedly ; for besides a loud rumbling noise, which is heard at a considerable distance, and for several days preceding any eruption, and a roaring and cracking in the part from whence the fire is going to burst forth, many fiery meteors are observed, but unattended in general with any violent concussion of the earth, though sometimes earthquakes, of which the history of the country affords several instances, have accompanied these dreadful conflagrations.

Among the traces left by these eruptions, are particularly the clefts which are frequently to be met with, the largest of which is Almennegiaa, near the water of Tingalla ; it is very

long, and 105 feet in breadth. The direction of the chasm itself is from north to south: its western wall, from which the other has been perpendicularly divided, is 107 feet 6 inches in height, and consists of many stratas (each of which is about ten inches in height) of lava, grown cold at different times, as may easily be discovered by the apparent crust, which is full of blisters, of a darker brown, and not so much compressed as the remaining part of the mass of lava. The eastern wall is only 45 feet 4 inches in height; and that part of it which is directly opposite to the highest part on the other side, is no more than 36 feet five inches high.

It is likewise considered as a sign of an impending eruption, when small lakes, rivulets, and streams dry up. Some persons believe, that it does not contribute a little to hasten the eruption, when the mountain is so covered with ice, that the holes are stopped up through which the exhalations, &c. often found a free passage.

Though it is by no means my opinion, that this contributes much to it,

it cannot be denied, that the fire is generally contained in these mountains covered with ice, or, as they are called in the country, *jökuls*.

The first thing that is usually observed, before a new eruption of fire, is the bursting of the mass of ice with a dreadful noise, whence it is called in Icelandic *Jökla-bliod* (Jokul's Sound) and *Jökla brestar*.

Flames then burst forth, and lightning and balls of fire issue with the smoak, which are seen several miles off. With the flames proceed a number of larger and smaller stones, which are sometimes thrown to an incredible distance. I have seen a round stone near Nafeirholt, about a mile from Heckla, which was an ell in diameter, and had been thrown there in the last eruption of Heckla. Egbert Olafsen also relates, that at the last eruption of Kattlegiaa, a stone which weighed 290 pounds was thrown to the distance of four miles.

A quantity of white pumice-stone is also thrown up with the boiling waters; and it is believed, with great probability,

bability, that the latter proceeds from the sea, as a quantity of salt sufficient to load several horses has frequently been found after the mountain has discontinued burning.

Then follows generally brown or black pumice-stone, and lava, with sand and ashes.

The lava is seldom found near the opening, but rather *tuffa*, or loose ashes and grit; and indeed the greater part of the Icelandic mountains consists of this matter, which, when it is grown cold, generally takes an arched form, some admirable proofs of which may be seen in the cleft at Allmannagíaa: the upper crust frequently grows hard and solid, whilst the melted matter beneath it continues liquid; this forms great cavities, whose walls, bed, and roof are of lava, and where great quantities of stalactite of lava are found.

There are a great number of these caves in Iceland, some of which are very large, and are made use of by the inhabitants for sheltering their cattle.

I will here only take notice of the cave of Surtheller, as the largest of all: it is between 34 and 36 feet in height; its breadth is from 50 to 54 feet, and it is 5034 feet long.

It would be both tedious and difficult to class the different compositions of fire in these places, as it is not easily discovered to which they belong: for example, jasper, of which great quantities of red and black are found inclosed in the lava, and mixed with it; I will therefore only name those which have been evidently produced by the fire. First, *tuffa*, a stone, ferminated ashes and grit, which sometimes is found mixed with lava, basalt, and other sorts of stones, and having been moistened by the spouting of water, grows hard by heat and length of time. Secondly, *lava*, is that kind of stone which has been melted by the violence of the fire, and varies according to the difference of the state in which it served as food to the fire. This lava is sometimes found solid, and at others porous and full of bladders

bladders and holes ; in the inside it is filled up with opaque and brittle square crystals of a dead white, or with green drops of glass, which decay after they have been long exposed to the air. The colour of the lava is black, dark blue, purple, reddish brown, or yellowish, but oftenest black or red. Where the fire has operated very strongly, it is, as it were, glazed, and looks like resin. In the frames or great tracts of lava it is sometimes observed, that the crust in growing cold has laid itself into folds ; but generally it forms itself into a resemblance of a rope or cable, sometimes lengthways, and at others in the form of a circle, like unto a great cable rolled together ; and generally so, that its thickness continually augments from the centre to the periphery. To this class I must also count a black solid matter, which strikes fire against steel, and sometimes takes the forms of trees or branches : some people have been inclined to think they are petrified trees, but I am rather
of

of opinion that it is a real jasper. Thirdly, pumice, black, red, and even white, which last has most probably been discoloured by the boiling water. Fourthly, agate; I preserve the received name, though it is really nothing more than burned glass. In some few places it is found white, transparent, and almost in the form of crystal. The bluish sort is also rare, but found in large pieces: the most common is the black agate, which is found generally in stratas, or in small nests, and sometimes almost in the shape of crystal, in oval, square, or pentagonal forms. The astronomer, Mr. Ejnar Jonson, has made use of this black glass in his tubes, both in Copenhagen and Iceland, for the observation of the sun, and has found them greatly preferable to the darkened glasses. The green agate is found rather coarser and more reddish, like thick bottle glass: it is called *hraflinnubrodcon*.

Brimstone, which may be considered as the proper fuel of the fire, is found
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in great abundance, pure and mineralized: in the north, principally at Husewick, and in the south at Krysewick, there are white brimstone mines which are called *Namas*. I shall reserve the basalts for a particular letter.

LETTER

LETTER XIV.

TO PROFESSOR BERGMAN.

Of Mount Heckla.

Stockholm, Sept. 7, 1773.

THE cause of Heckla (or, as it is called in the country, *Heckla-fiall*) having been more noticed than many other volcanos of as great extent, and no less wonderful and instructive, may partly be ascribed to its having vomited fire so frequently, and partly to its situation, which exposes it to the sight of all the ships sailing to Greenland and North America: as we considered it with greater attention than any other volcano on the island, I will give you a description of the state in which we found it on the 24th of September 1772.

After we had seen many tracts of lava, among which Garde and Wvalupe Hraune were the most considerable,

able, we pursued our journey to the foot of the mountain. We had a tent pitched here, where we proposed to pass the night, to enable us to ascend the mountain with greater spirits in the morning. The weather was extremely favourable, and we had the satisfaction of seeing whatever we wished, the eruption only excepted.

The mountain is situated in the southern part of the island, about four miles from the sea-coast, and is divided into three points at the top, the highest of which is that in the middle, and is, according to an exact observation with Ramsden's barometer, 5000 feet higher than the sea. We made use of our horses, but were obliged to quit them at the first opening from which the fire had burst. This was a place surrounded with lofty glazed walls, and filled with high glazed cliffs, which I cannot compare with any thing I ever saw before.

A little higher up we found a great quantity of grit and stones, and still farther on another opening, which though not deep, however descended
lower

lower down than that of the highest point. We thought we plainly observed evident marks of hot boiling water in this place.

Not far from thence the mountains began to be covered with snow, some small spots excepted, which were bare. We could not at first discern the cause of this difference, but soon found that it proceeded from the vapour which arose from the mountain. As we ascended higher, these spots became larger; and about two hundred yards from the summit we found a hole of about one yard and a half in diameter, from which so hot a steam exhaled, that it prevented us from ascertaining the degree of heat with the thermometer.

The cold now began to be very intense, as Fahrenheit's thermometer, which was at 54 at the foot of the mountain, fell to 24. The wind was also become so violent, that we were sometimes obliged to lie down to avoid being thrown into the most dreadful precipices by its fury.

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We were now arrived at one of the highest summits, when our conductor, who did not take great pleasure in the walk, endeavoured to persuade us that this was the highest part of the mountains. We had just finished our observations, and found by them that Ramsden's barometer stood at 24-238, and the thermometer, fixed to it, at 27, when happily the clouds divided, and we discovered a still higher summit. We lost no time in deliberation, but immediately ascended it, and when at the top discovered a space of ground, about eight yards in breadth, and twenty in length, entirely free from snow; the sand was, however, quite wet, from its having lately melted away. Here we experienced at one and the same time, a high degree of heat and cold, for in the air Fahrenheit's thermometer was constantly at 24, and when we set it down on the ground, it rose to 153. The barometer was here at 22-247, and the thermometer at 38.

We could not with safety remain here any longer, though we were very

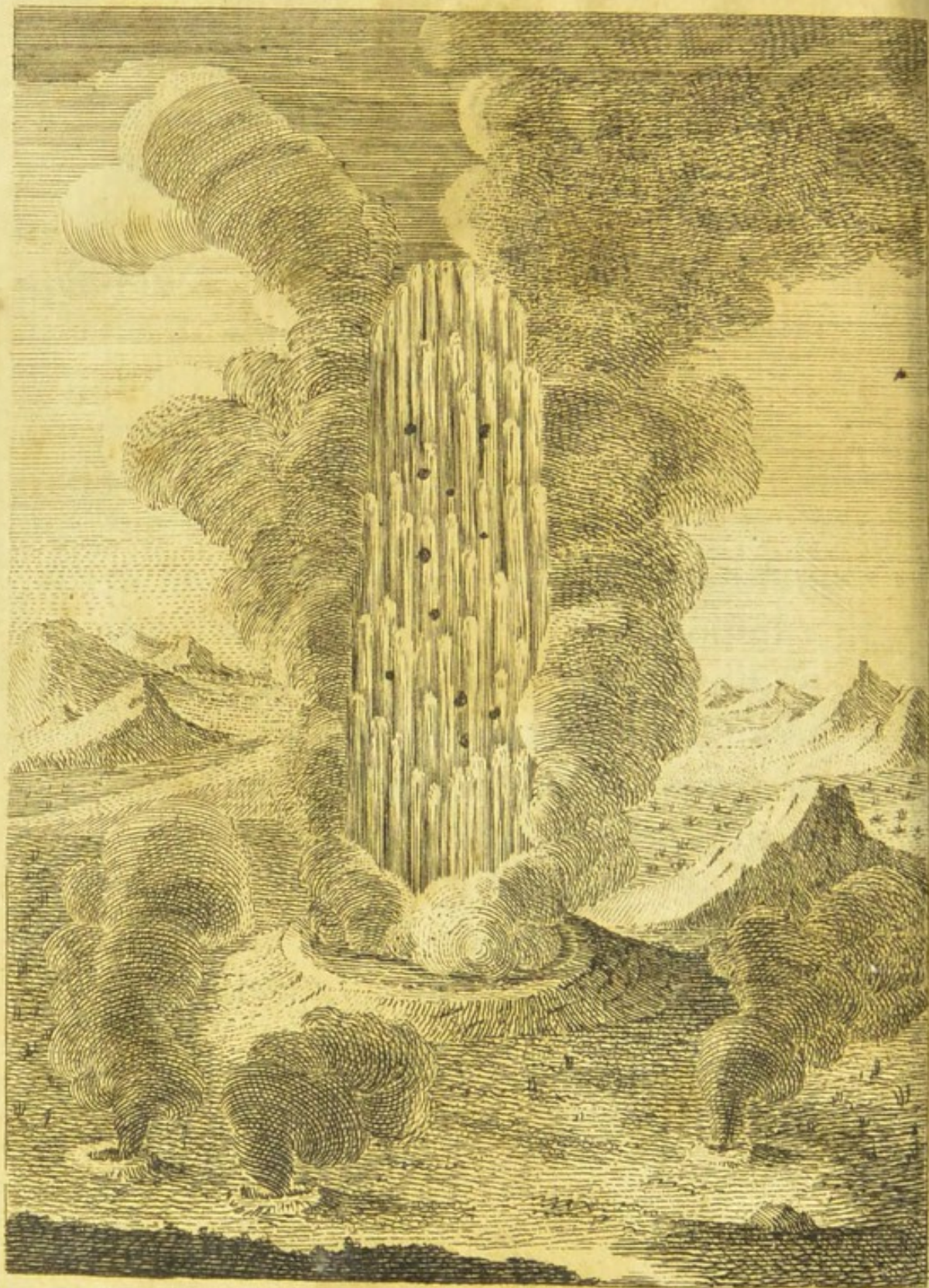
much inclined to it; and descended, after having considered the last opening there, one of the sides of which was entirely overturned, and the other quite covered with ashes and grit. In our return we observed three considerable openings, in one of which every thing looked as red as brick. From another the lava had flowed in a stream of about 50 yards in breadth, which the Icelanders call *Stenaa*, or Stone Flood; and at some distance from thence the stream divided into three broad arms. Further on we found a large circular opening, at the bottom of which we observed a mountain in the form of a sugar-loaf, in throwing up of which the fire seemed to have exhausted itself.

The last eruption of mount Heckla happened in 1766; it began the 4th of April, and continued to the 7th of September following. Flames proceeded from it in December 1771, and in September 1772, but no flowing of lava, &c.

The mountain does not consist of lava, but chiefly of sand, grit, and

ashes, which are thrown up with the stones, partly melted, and partly discoloured by the fire. We likewise found several sorts of pumice, and among them one piece with some sulphur in it. The pumice was sometimes so much burnt, that it was as light as tow; their form and colour was sometimes very fine, but at the same time so soft, that it was difficult to remove them from one place to another: of the common lava we found both large pieces and small bits, as likewise a quantity of black jasper, burned at the extremities, and resembling trees and branches. Among the stones thrown out of the mountain we saw some slate of a strong red colour.





B. Sc.

GEYSER.

L E T T E R X X I.

To Professor B E R G M A N.

*Of the hot spouting Water-springs in
Iceland.*

Stockholm, Oct. 3, 1774.

A MONG all the curiosities in Iceland, which nature presents to the eyes of an attentive spectator to raise his admiration, nothing can be compared to the hot spouting water-springs with which this country abounds. The hot springs at Aken, Carlsbad, Bath, and Switzerland, and several others which are found in Italy, are considered as very remarkable; but to my knowledge, except in the last-mentioned country, the water no where becomes so hot as to boil; nor is it any where known to be thrown so high as at the hot spouting water-springs in Iceland.

All those jets d'eau which have been contrived with so much art, and at so enormous an expence, cannot by any means be compared with these. The water-works at Herrenhausen throw up a single column of water, of half a quarter of a yard in circumference, to the height of about 70 feet; those on the Winterkasten, at Cassel, throw it up, but in a much thinner column, 130 feet; and the jet d'eau at St. Cloud, which is thought the greatest amongst all the French water-works, casts up a thin column 80 feet into the air: whilst some springs in Iceland pour forth columns of water, of several feet in thickness, to the height of many fathoms; and many affirm, of several hundred feet.

But, without relying upon what has been said by others of these wonderful phænomena of nature, I think myself happy to have contemplated with mine own eyes the most remarkable of these springs, which has enabled me to give you an accurate account of it. I only beg leave to say something of them in general, before
I treat

I treat of that which I saw in particular.

These springs are of unequal degrees of heat. From some the water flows gently as from other springs, and it is then called *laug*, a bath; from others, it spouts boiling water with a great noise, and is then called *hver* or *kittel* (*keffel*). Though the degree of heat is unequal, yet I do not remember ever to have observed it under 188 of Fahrenheit's thermometer. At Laugarnas we found it at 188, 191, 193. At Geyser, Reykum, and Laugarvatn 212; and in the last place, in the ground, at a little hot vein of water, 213 degrees.

It is very common for some of the spouting springs to close up, and others to spring up in their stead; there are likewise frequent traces of former *hvers*, where at present not a single drop of water is to be seen. Many remember to have seen instances of this; and Egbert Olafsen relates, that in 1753 a new *hver* broke forth at Reikakio, seven fathoms in breadth, and three in depth, at the distance of 50

fathoms from an old spring, which had been stopped up by a fall of earth. Frequent earthquakes and subterranean noises, heard at the time, caused great terror to the people who lived in the neighbourhood.

All these hot waters have an incrusting quality, so that we very commonly find the exterior surface from whence it bursts forth covered with a kind of rind, which almost resembles chaced work, which we at first took for lime ; but we soon became dubious of this, as it did not ferment with acid ; but we hope that you, Sir, will soon resolve us. This crust is in general very fine ; but it is, however, most pure and clear at the spouting springs ; for at the others, where the water flows, the parts precipitated by the water are sometimes mixed with earth, which makes the crust appear darker.

At the *bvers* it is very difficult, nay almost impossible, to examine within the opening the disposition of the passage which the water has formed, both by reason of the heat of the water,
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and the violence with which it is forced out. One may, however, with confidence judge of the great by the small ; and it gave us the greater pleasure, as we had an opportunity at Laugarnas to examine the vein of water itself a considerable way under the crust.

The water had in this place taken its course through a bright grey clay, the surface of which was covered with a white rind ; but was on the side nearest the clay, quite smooth, and crisped on the upper side. The vein flowed a good way under this crust, through a canal formed of a similar matter ; and the whole canal was filled with crystals, which had a very pleasing effect. I had not time to examine their nature and form on the spot, as they were very small ; but I expect a more particular account of this subject from you, as you will find several specimen of them in the collection I sent you. We could not, however, pursue the course of the water very far, as we were obliged to leave it to its subterranean passages, through which nature had seduced

ced it from its reservoirs, where heated by the warmth, and compressed by the exhalations, it at last bursts from its prison, by gushing forth at another place, in order make way for its vapours.

The water in some places tastes of sulphur, and in others not ; but when drank as soon as it is cold, tastes like common boiled water. The inhabitants use it, at particular times, for dying ; and were they to adopt proper regulations, it might be of still greater use. Victuals may also be boiled in it, by putting it into a pot covered, and boiling it till a certain quantity is evaporated. Milk held over this water when boiling becomes sweet, owing, most probably, to its excessive heat ; as the same effect is produced by boiling it a long time over the fire. They have begun to make salt, by boiling sea-water over it, which, when it is refined, is very fine and good. The cows which drink of it yield a great quantity of good milk. Egbert Olafsen informs us, that the water does not become troubled when alkali is thrown

thrown into it, nor does it change colour from syrup of violets. I do not know what degree of credit ought to be given to Horrebow, who asserts, that if you fill a bottle at one of the spouting springs, the water contained in the bottle will boil over two or three times during the time the spring throws it forth, and if corked too soon the bottle will burst.

Though it cannot be denied that these springs have some communication with the Icelandic volcanos, yet they are seldom found very near them, but are dispersed throughout the whole country. For this reason, hot springs are found among the mountains, and even on the top of the ice mountains; as on Torfa Jockul, where a great number of hot springs are to be met with; and among them two large *hvers*, which throw up the boiling water to a great height. There is likewise a lukewarm spring near Haadegis Hnuk, on Gutlands Jokul, at the foot of the mountain, with many traces of former *hvers*. There are even in the sea hot spouting springs, which can only be ap-

approached at low water; as at Reyka-fiord in Isa-fiord, where four springs may be observed in the water by the ascending steam, and one *hver* on the surface of the water. There are also two others in the Oddbiarnar shoals, still more at Drapskar, and a great number at Sando, Urdholm, Reykey, and on the flat islands. To give a better idea of the situation of these springs, I will give a list of them, which I will endeavour to make as topographical as possible.

In Borgarfjord's Syffel, near Leyraa, not far from the foot of the mountain of Skardsheides, we met with the first *hver*, which is, however, not a very strong one; and not far from it there is a small bath. At Lunda Reykiadal there is a *hver* and a bath; and near a farm-yard, Varma-Lakiar-Mula, a warm spring and a bath. A little farther to the north is the valley of Reykholt, which is two miles and a half in breadth, in the bottom of which hot baths are every where to be met with. This spot may be discovered at several miles distance by the vapours
which

which exhale every where from the hot water, and unite in the air, resembling a prodigious smoke arising from some volcano. The three principal *hvers* in this place are, Tunguhver, Aa-hver, and Scribla; the last furnishes water to Snorralaug, Snorre Sturleson's bath, which is esteemed the best in Iceland. From this place there is no hot spring to be met with northward for a very large tract, till you come to Sneefield's Cape, where there is a lukewarm spring near the farm called Lysehol, in Stadesveit: at this place many remains of ancient *hvers* are to be seen. Still further to the north, in Dale Syffel, is a warm bath with some springs. In Soling's Valley, and further on, near the farm Reykaholer, in Reykianas, are many strong *hvers*; particularly three very large ones, the most considerable of which is Krablanda. From thence we came to the hot springs of Flatdarna, Oddsbiarmarskar, and Drapskar; and afterwards visited those at Talkne-fiord, Arnarfiord, and Isa-fiord in Reyka-fiord, where there is a strong spouting spring.

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After we had past Cape Nord, or the northern extremity of Iceland, we met with some warm springs at Reykar-fiord; others, together with a fine bath, at Biarnar-fiord, near Kaldadarna: at Hruta-fiorden there is a great *hver* calle Reike-hver, and another as large at Midfiorden, called Reixalaug. When you go from hence southward into the country, you will find a number of boiling springs at Hverevalle, three of which spout the water high into the air with a prodigious noise; still further to the south there is a *hver* near Geitland's Jokul.

If we turn again to the north, we find hot springs at Blanda, others near the haven at Skaga-Strand, and still more at a little distance from thence at Skaga-fiorden; one of which falls from a rock thirty feet high. To the east there are hot springs in many places of Vadle Syffel, as at Olafs-fiordr, Langaland, Kristnas, and Hrafnegil; but in Thingo Syffel there are springs of both sorts (baths and *hvers*) in great number, and of considerable dimensions. The *hvers* in Reykia Valley

Valley deserve to be particularly mentioned, amongst which Oxe and Badstofu are the largest.

On the east side of the country there are no considerable *hver*s, though warm springs are to be found in Selar, Laugarvalle, Rafukells, and Fliots valleys; and on the south, on Torfa Jokul, We then proceeded to Skallholt, where there are many springs; about a mile from thence the *hver*s, called Reikholt and Grafa, both which spout very high. The next *hver* is Geyser, which I shall afterwards mention more minutely. Not far from this last is Laugervatn, a small lake, round which a number of warm springs may be observed, and eight boiling ones. The road now leads us to the *hver*s at Oelves, which is thought to be the largest in all Iceland; the most remarkable of which are Geyser and Badstofu.

Here is also a dry *hver*, from which water formerly proceeded, but now emits only steam through its mouth; the heat of which however is so great, that
a pot

a pot of water placed over the opening boils in a very short time. We met with spouting springs at Krusevik in Gullbringe Syssel, the *hver* Eine, the *hvers* at Reikianas, and several at Langarnas in Kiofar Syssel.

From this list, which, however, is far from containing all the warm springs in Iceland, you may judge, Sir, of the prodigious number that we met with. Near most of them are warm baths, each of which merits a particular examination and description. Eggert Olafsen and Biarne Paulsen have made very curious observations on several of them; but I only beg leave to mention some which I made at Geyser, where is the largest of all the spouting-springs in Iceland, or perhaps in the known world. These observations were made the 21st of September 1772, from six o'clock in the morning till seven at night.

Among the hot springs in Iceland, several of which bear the name of *geyser*, there are none that can be compared with that which I am going

to describe, though the best description will fall very short of it. It is about two days journey from Heckla, not far from Skallholt, near a farm called Haukadal. Here a poet would have an opportunity of painting a picture of whatever Nature has of beautiful and terrible united, by delineating one of its most uncommon phænomena: it would be a subject worthy the pen of a Thompson to transport the reader, by poetical imagery, to the spot which is here presented to the eye. Represent to yourself a large field, where you see on one side, at a great distance, high mountains covered with ice, whose summits are generally wrapped up in clouds, so that their sharp unequal points become invisible. This loss however is compensated by a certain wind, which causes the clouds to sink, and cover the mountain itself, when its summit appears as it were to rest upon the clouds. On the other side, Heckla is seen, with its three points covered with ice, rising above the clouds, and with the smoke which ascends from it, forming other clouds at

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some distance from the real ones: and on another side is a ridge of high rocks, at the foot of which boiling water from time to time gushes forth; and further on extends a marsh of about half a mile in circumference, where are forty or fifty boiling springs, from which a vapour ascends to a prodigious height.

In the midst of these is the greatest spring *geyser*, which deserves a more exact and particular account. In travelling to the place, about a quarter of a mile from the *hver*, from which the ridge of rocks near it still divided us, we heard a loud roaring noise, like the rushing of a torrent, precipitating itself from stupendous rocks. We asked our guide what it meant: He answered, it was *geyser* roaring; and we soon saw with our naked eyes what before appeared almost incredible.

The depth of the opening or pipe from which the water gushes cannot well be determined; for sometimes the water sunk down several fathoms, and some seconds passed before a stone which was thrown into the aperture, reached

reached the surface of the water. The opening itself was perfectly round, and nineteen feet in diameter; it ended above in a basin which was fifty-nine feet in diameter; both the pipe and the basin were covered with a rough stalactic rind, which had been formed by the force of the water; the uttermost border of the basin is nine feet and an inch higher than the pipe itself.

The water here spouted several times a day, but always by starts, and after certain intervals. The people who lived in the neighbourhood told us, that they rose higher in cold and bad weather than at other times; and Eggert Olafsen and several others affirm, that it spouted to the height of sixty fathoms. Most probably they only guessed by the eye, and on that account their calculation may be a little extravagant; and indeed I doubt that ever the water was thrown up so high, though I am much inclined to believe, that it sometimes mounts higher than when we observed it.

I will here insert an account, how high the water was thrown the day that we were there, which I hope, will not be disagreeable to you. We observed the height thus ; every one in company wrote down at each time that the water spouted, how high it appeared to him to be thrown, and we afterwards chose the medium. The first column marks the spoutings of the water, in the order in which they follow one another ; the second, the time when these effusions happened ; the third, the height to which the water rose ; and the last, how long each spouting of water continued.

Nº	Time.	Height.	Duration.
1	At VI 42m.	30 feet	0 m. 20s.
2	- 51 -	6 -	0 20
3	VII 6 -	6 -	0 10
4	- 31 -	12 -	0 15
5	- 51 -	60 -	0 6
6	VIII 17 -	24 -	0 30
7	- 29 -	18 -	0 40
8	- 36 -	12 -	0 40
The			

The pipe was now for the first time full of water, which ran slowly into the basin.

Nº	Time.	Height.	Duration.
9	IX 25	- 48 -	I 10
10	X 16	- 24 -	I 00

XII 35 minutes we heard as it were three discharges of a gun under ground, which made it shake, the water immediately flowed over, but sunk again instantly.

II 8 the water flowed over the border of the basin.

III 15 we again heard several subterraneous noises, tho' not so strong as before.

IV 43 the water flowed over very strongly during a whole minute.

49 we again heard many loud subterraneous discharges, not only near the spring, but also from the neighbouring ridge of rocks, where the water spouted.

11	VI 51	- 92 -	4 00
		R 3	After

After this great effort, the water funk down very low into the pipe, and was entirely quiet during feveral minutes, but it foon began to bubble again ; it was however not thrown up into the air, but only to the top of the pipe.

Nº	Hours.	Min.	Nº	Hours.	Min.
1	5	7	18	5	42
2	5	$9\frac{1}{2}$	19	5	$43\frac{1}{2}$
3	5	$10\frac{1}{2}$	20	5	47
4	5	$13\frac{1}{2}$	21	5	$48\frac{1}{2}$
5	5	$14\frac{3}{4}$	22	5	49
6	5	17	23	5	$30\frac{1}{2}$
7	5	$18\frac{3}{4}$	24	5	$51\frac{1}{2}$
8	5	$20\frac{1}{8}$	25	5	54
9	5	$21\frac{1}{2}$	26	5	$37\frac{1}{2}$
10	5	$23\frac{1}{2}$	27	5	59
11	5	$27\frac{3}{4}$	28	6	10
12	5	$30\frac{1}{4}$	29	6	19
13	5	$31\frac{3}{4}$	30	6	23
14	5	$33\frac{1}{2}$	31	6	26
15	5	35	32	6	29
16	5	36	33	6	30
17	5	38			

The force of the vapours which throw up this water is exceffive ; it
not

not only prevents the stones which are thrown into the opening from sinking, but even throws them up to a very great height, together with the water. I must not forget to mention a very curious circumstance: when the basin was full of water, we placed ourselves before the sun in such a manner, that we could see our shadows in the water, every one observed round the shadow of his own head (though not round the heads of the others) a circle of almost the same colours which compose the rainbow, and round this another bright circle: this most probably proceeded from the vapours exhaling from the water. I remember to have seen something similar to it when travelling in the summer, particularly in the meadows, and it is soonest observed when riding on horseback, or in a carriage, when you have your shadow on one side.

Not far from this place, another spring at the foot of the neighbouring ridge of rocks spouted water to the height of one or two yards each time.

N ^o	Hours.	Min.		N ^o	Hours.	Min.
1	3	45	— —	7	4	0
2	3	47 $\frac{1}{2}$	— —	8	4	3
3	0	50 $\frac{1}{2}$	— —	9	0	5 $\frac{3}{4}$
4	0	53 $\frac{1}{2}$	— —	10	0	8 $\frac{1}{2}$
5	0	55	— —	11	0	11 $\frac{1}{4}$
6	0	57 $\frac{3}{4}$	— —	12	0	14

The opening through which this water issued was not so wide as the other; we imagined it possible to stop up the hole entirely by throwing large stones into it; and even flattered ourselves that our attempt had succeeded, but to our great astonishment the water gushed forth in a very violent manner, which shews how little the weak efforts of man avail, when they endeavour to proscribe bounds to the works of Nature. We hastened to the pipe, and found all the stones thrown aside, and the water playing freely through its former channel.

In these large springs the waters were hot in the highest degree, and tasted a little of sulphur, but in other respects were pure and clear. In the smaller springs in the neighbourhood

the water was tainted ; in some it was as muddy as that of a clay-pit, in others as white as milk ; and yet there are a few springs where the water forces itself through a fire underneath as red as blood.

I have already observed, that near most of these springs and *hver*s there are baths, which are frequently visited by the natives : there are also in many places dry and sweating-baths. Eggert Olafsen mentions one of these baths at Huusevik, in North Iceland ; and I had the curiosity of seeing one of them at Thibsaarholt, not far from Skallholt, which consisted of a hut raised of earth, into which hot steams arose from many holes. Fahrenheit's thermometer, which was at 57 degrees in the open air, rose to 93 in the hut whilst it was open, and when it was placed in one of the little openings the steam arose to 125.

L E T T E R XXII,

To Professor BERGMANN,

Of the Pillars of Basalt.

Stockholm, June 6, 1773.

AMONG the effects of fire, some of which are extremely dreadful, and all of them very extraordinary and remarkable, none have in latter times attracted more attention than those large regular pillars known by the name of Basalts. There had formerly been hardly any places observed in Europe, where this kind of stone was found, the Giant's Causeway excepted; and the greater part of our mineralogists have, if I am not mistaken, considered them as a kind of chrystalization. Mr. Desmarests was the first who maintained in a dissertation presented to the French academy of sciences, that they were produced by fire, wherein he described some basalts found near St. Sandour in Auvergne.

This opinion at first appeared almost absurd to our natural historians, as it was not believed that volcanos had ever been in these places where basalt pillars were found.

This new discovery however occasioned a more exact enquiry concerning other places where these pillars are met with. All these enquiries only served to confirm Mr. Desmarets's opinion, by proving that these basalt pillars must have been produced by subterraneous fires.

There is no one surely will entertain the least doubt of a subterraneous fire having formerly existed where these pillars now stand, as at Stolpenstein in Meissen; near Lauban in Lusatia; in Bohemia; near Liegnitz in Silesia; near Brandau in Hesse; in Sicily; near Bolsenna, Montebello and St. Forio in Italy; near St. Lucas in the district of St. Vicenza; near Monte Rosso in the Paduan district, and Monte Diavolo in the mountains of Verona; in Lower Languedoc; in Iceland, and in the western islands of Scotland; which you, Sir, have all men-

mentioned in your Cosmography. Also in St. Giovanni, Monte Castello, Monte Nuovo, Monte Oliveto, near Cadair Idris in Wales, in England, almost every where in Velay and Auvergne, where whole towns, as Chillac and St. Flour, are built upon these pillars. But as this matter has not yet been fully investigated, and it cannot be determined with certainty in what manner these pillars are formed, though they are known to be produced by fire, perhaps it will not be disagreeable to you, if I say something of the many basalt pillars in Iceland, as well as of those in the isle of Staffa, which you will readily acknowledge to be more singular than any thing Nature ever produced of this kind.

It is well known that these pillars are very common in Iceland, and some account is also given of them in the Physical Description published of the country. The lower sort of people imagine these pillars have been piled upon one another by the giants, who made use of supernatural force to effect it,

it, whence they have obtained the name of the *Trolla-blaud Trollkonu-gardur* in several places. They have generally from three to seven sides, and are from four to six feet in thickness, and from twelve to sixteen yards in length, without any horizontal divisions. But sometimes they are only from six inches to one foot in height, and they are then very regular, as those at Videy, which are made use of for windows and door-posts. In some places they only peep out of the mountains here and there among the lava, or still oftener among *tuffa*; in other places they are quite overthrown, and only pieces of broken pillars appear. Sometimes again they extend two or three miles in length without interruption. In the mountain called Glockenberg in Snefiald-fnas, this kind of stone appears in a manner very different from any other place in Iceland; for on the top the pillars lie quite horizontally, in the middle they are sloping, and the lowest are perfectly perpendicular; in some places they are bent as a semi-circle,

circle, which proves a very violent effect of the fire on the pillars already standing, as in most places, or at least in a great many, they are intirely perpendicular, and by their form and situation, that they have even been burnt in a perpendicular direction.

As to the matter of which the Icelandic basalts are composed, it is in some places similar to that of which the pillars at Staffa consist, though in others it is more porous, and inclines more to grey. And who knows, if an attentive and curious naturalist, who had both time and talents requisite for such an undertaking, might not easily trace all the gradations between the coarsest lava and the finest pillar of basalt? I myself saw some of this last sort at Videy, which were solid, of a blackish grey, and composed of several joints. And not far from thence, at Laugarnäs, near the sea-shore, I saw a porous glassy kind of stone, consequently lava, but was so indistinctly divided, that I was a long time undetermined, whether I should consider it as pillars or not ;
but

but at length the rest of the company, as well as myself, were persuaded that they really were such. But I will postpone the examination of the matter of which these pillars consist, and of the manner in which they are formed, till such time as I have given you the promised description of the isle of Staffa.

A piece of good fortune procured us the pleasure of being the first who ever examined these wonders of Nature with an attentive eye. Among all those who have published descriptions of Scotland, there are none except Buchanan, whose account, however, is very imperfect, that mentions a single syllable of these pillars. Mr. Pennant, an indefatigable and experienced naturalist, in the same year that we visited this island, made a tour to Scotland to examine the natural productions of that country, but was prevented by a contrary wind from going to Staffa. Most probably we should not have come there neither, if the usual ebb and flood, which is very strong

strong between the western islands of Scotland, had not forced us in our way to Iceland, on the twelfth of August in the night, to cast anchor in the Sound, between the isle of Mull and Morvern on the Continent, exactly opposite to Drumnien, the seat of Mr. Maclean. We were immediately invited to land, and breakfasted there, with that hospitality which characterises the inhabitants of the Highlands of Scotland. Mr. Leach, another guest of Mr. Maclean, gave us many particulars of these pillars, which he had visited a few days before. Mr. Banks's desire of information could not resist the offer of this gentleman to accompany us to Staffa; we therefore went on board our long-boat the same day, and arrived there at nine o'clock in the evening. It was impossible for our surprize to be increased, or our curiosity to be fuller gratified, than they were the next morning when we beheld the no less than beautiful spectacle which Nature presented to our view.

If

If we even with admiration behold art, according to the rules prescribed to it, observing a certain kind of order, which not only strikes the eye, but also pleases it ; what must be the effect produced upon us when we behold Nature displaying as it were a regularity which far surpassed every thing art ever produced ! An attentive spectator will find as much occasion for wonder and astonishment, when he observes how infinitely short human wisdom appears, when we attempt to imitate Nature in this as well as in any other of her grand and awful productions. And though we acknowledge Nature to be the mistress of all the arts, and ascribe a greater degree of perfection to them, the nearer they approach and imitate it, yet we sometimes imagine that she might be improved, according to the rules of architecture.

How magnificent are the remains we have of the porticos of the antients ! and with what admiration do we behold the colonnades which adorn the principal buildings of our times ! and

yet every one who compares them with Fingal's Cave, formed by Nature in the isle of Staffa, must readily acknowledge, that this piece of Nature's architecture far surpasses every thing that invention, luxury, and taste ever produced among the Greeks.

The island of * Staffa lies west of Mull, three miles N. E. of Jona or Columb-Kill, and is about a mile in length, and half a mile in breadth : it belongs to Mr. Lauchlan Mac-Quarie. On the west side of the island is a small cave, where there is a very convenient landing place, but where no regular basalt figures are to be met with. To the south of this cave are some narrow pillars, which, instead of standing upright, are all inclined, and look like so many pieces of an arch. Further on

* Mr. Banks's account of this island, as communicated by that intelligent gentleman to Mr. Pennant, and inserted in his *Tour in Scotland, and Voyage to the Hebrides* in 1772, is too curious to be omitted, as it is not only very interesting in itself, but is an undeniable proof of the accuracy and fidelity with which our author, Dr. Troil, has treated of the various subjects contained in this publication :—the Editor deems it therefore unnecessary to apologize for subjoining an extract of it to this letter.

you leave a small grotto on your right hand, which is not composed of pillars, tho' they appear more distinctly and larger above it, and in one place resemble the interior timber-work of a ship. Directly opposite to it, only a few yards distant, is the peninsula of Bo-scha-la, which entirely consists of regular though less pillars, that are all of a conical figure. Some of them lie horizontally, others incline as it were to the central point, as to the upper end, but the greater number are perfectly perpendicular. The island itself, opposite to Bo-scha-la, consists of thick columns or pillars, which are not however very high, as they gradually decrease in approaching to the water, and extend into the sea as far as the eye can reach. You may walk upon these with great ease, as from one step of a stair-case to another, till you come to Fingal's, or more properly speaking, to Fiuhn Mac Coul's grotto or cave, which enters into the mountain from N.E. to E.

This cave consists of very regular pillars, which to a great extent on

both sides, and in the most interior part, support an arched vault, composed of the obtuse points of pillars crowded close together. The bottom of the cave, which is filled with clear fresh water several feet in depth, is likewise covered with innumerable pieces of pillars, which compose its floor. The colour of the pillars is of a blackish grey; but between the joints there is a yellow stalactic quarry rind exhaled, which serves to make these divisions more distinct, and produces an agreeable effect to the eye, by the many different modulations of colour. It is so light within the cave, that one can distinguish the innermost range of pillars perfectly well from without. The air in it is very pure and good, as it is constantly changed by the rising and falling of the water during the tide. Very far into the cave there is a hole in the rock, somewhat lower than the surface of the water standing in it, which makes a pleasing kind of noise on every flux and reflux of the tides. One may walk in most parts of the
cave

cave on the broken points of some pillars rising above the surface of the water, but it is most convenient to go in a boat. We made the following measurements of the cave :

	F.	I.	F.	I.
The length, from the farthest of the basalt pillars, which from the shore formed a canal to the cave, - -	121	6	371	6
From the commencement of the vault to the end of the cave,	250			
The breadth of its entrance,			53	7
Of the interior end,			20	0
The height of the vault at the entrance of the cave,			117	6
Of ditto, at the interior end,			70	0
The height of the outermost pillar in one corner, -			39	6
The height of another, in the north-west corner, -			54	0
The depth of the water at entrance, - -			18	0
Of the inside end, -			9	0
S 3			Above	

Above the cave was a stratum of a stone mixed with pieces of basalt. We made the following measurements :

F. I.

From the water to the foot of the pillars,	-	-	36 8
Height of the pillars,	-		32 6
Height of the arch or vault above the top of the pillars,			31 4
The stratum above this,			34 4

From hence, a little farther north-west, we met with the largest pillars which are to be found in the whole island. The place on which they stood was likewise quite free, so that we were enabled to examine it. The following was the result of our measurement :

The western corner of Fingal's Cave:

1. From the water to the foot of the pillars,	-	12 10
2. Height of the pillars,		37 3
3. The stratum above them,		66 9

Farther westward :

1. The stratum beneath the pillars,	-	-	11 0
2. Height of the pillars,			54 0
3. The stratum above,			61 6

Still

Still more westward : F. I.

1. Stratum beneath the pillars,	-	-	-	17	1
2. Height of the pillars,				50	0
3. The stratum above them				51	1

Still more to the west :

1. Stratum beneath the pillars,	-	-	-	19	8
2. Height of the pillars,				55	1
3. The stratum above,				54	7

The stratum beneath the pillars here mentioned, is evidently *tuffa*, which had been heated by fire, and seems to be interlarded, as it were, with small bits of basalt ; and the red or stratum above the pillars, in which large pieces of pillars are sometimes found irregularly thrown together, and in unequal directions, is evidently nothing else but lava. Though a prodigious degree of fire must formerly have been requisite to produce this upper stratum, yet there are not the least traces in its exterior, the pillars having been removed by it, for the whole enormous mass rests upon them.

When you move farther on, and pass the northern side of the island,

you come to Corvorant's Cave, where the bed beneath the pillars is raised, and the pillars themselves decrease in height: they are, however, tolerably distinct, till you are past a bay which extends very far into the country, on the side of which the pillars entirely disappear. The mountains here consist of a dark brown stone, of which I cannot affirm with certainty whether it is lava or not, and where not the least regularity is to be observed; but as soon as you pass the south-east side of the island, the stones begin again to assume a regular figure, though so gradually, that it is scarcely perceptible at first, till at last, the regular and crooked pillars again appear with which I began my description.

The pillars have from three to seven sides, but the greater number have five or six, and so crowded together, that a heptagonal pillar is surrounded with seven others, which join closely to its seven sides. In some places, however, there are little insignificant openings, but they are filled up with *quarz*, which

which in one place had even made its way through a number of pillars, though without in the least destroying their regularity. The pillars consist of many joints or pieces, of about a foot in height, which so exactly fit upon one another, that it is difficult to introduce a knife between the interstices. The upper piece was generally concave, sometimes flat, and rarely convex; if the upper joint was flat, the lowest was so likewise, but when it was excavated, the lower one was rounded and reversed.

The sides of the pillars are not all equally broad. The following measurements were taken of four pillars:

N^o I. with 4 sides. F. I.

1st side	Diameter	I	5
2d	-	I	I
3d	-	I	6
4th	-	I	I

N^o II. with 5 sides.

1st side	Diameter	I	10
2d	-	I	10
3d	-	I	5
4th	-	I	7 $\frac{1}{2}$
5th	-	I	8

N^o III.

F. I.

N^o III. with 6 fides.

1 ft fide		Diameter	0	10
2d	-	-	2	2
3d	-	-	2	2
4th	-	-	1	11
5th	-	-	2	2
6th	-	-	2	9

N^o IV. with 7 fides.

1 ft fide		Diameter	2	10
2d	-	-	2	4
3d	-	-	1	10
4th	-	-	2	0
5th	-	-	1	1
6th	-	-	1	6
7th	-	-	1	3

The pillars are all over as smooth, and as sharp cornered as those of the Giant's Causeway; their colours are generally black, though the external fides sometimes incline to yellow, as their surfaces are bleached by the weather. As to their grain and substance, they intirely resemble, and are most probably the same original substance as the Icelandic agate. As I have nothing remaining of it, I cannot examine

amine what effect borax and other alloys, or aqua-fortis, and the like, would have upon it: what is the nature of its proper gravity, and what polish it will admit of, it would, notwithstanding, be useful to be informed of in order to compare it with similar kinds of stone from other parts.

But in what manner have these regular pillars been produced? It is the received opinion that the fire has been necessary to it: you have yourself remarked, Sir, that it must either have been a matter which had been melted by fire, and burst afterwards, and that then a liquid, which we are yet unacquainted with, must have produced their regular crystalline figures; or else it must have been, as you have likewise observed, a kind of earth, which, after having been softened by the exhalations arising from a subterraneous fire, its whole mass was forced out of its situation, and assumed this regular form as it grew dry. I have noticed this distinct and regular appearance in dried clay, and even in starch when dried in a cup or basin.

For

For it may be demonstrated that they are not crystals formed by Nature, by their not being produced as all other crystals are, by external apposition (*per appositionem*) nor in any other matrix, as is common among crystals.

It would be very difficult to determine whether the matter of which these prismatic pillars consist, burst into these regular forms after it was melted, and was growing cold, or whilst it was drying, as you seem inclined to believe: I cannot deny that my eyes have prepossessed me in favour of the first opinion, in all those places where I have seen any of these pillars; but as so many objections may be offered against this opinion, I am obliged to leave the matter undetermined. The following may, however, serve as a proof, that I did not, without due foundation, believe them to be a kind of lava, which burst in growing cold and hard. First, you find both in the island of Staffa and many other places, that the pillars stand on *lava* or *tuffa*, and are surrounded by this matter. Secondly,

Secondly, at Staffa, there was a large stratum above the pillars, in which there were many pieces of these pillars irregularly thrown among one another, which leaves us to conjecture that they must have been more in number, and higher after an old eruption of fire, but that a subsequent eruption had overthrown them, and mixed them with the whole mass. Thirdly, we found one of these pillars, on breaking it, full of drops, almost like a lactile or dripping stone; and none surely will pretend a basalt to be of such a composition. Fourthly, I have formerly said, that the pillars in some places resemble the inside timber-work of a ship; that is to say, these pillars which most probably were quite straight at first, in falling received this crooked inclination; nor were it alone the joints of the outermost or lowest side which warped a little, but each stone was bent singly. Fifthly, we found on the shore at Hiftra, near Skallholt, a piece of basalt, with a piece of glass sticking in it, in the same manner as granate formed crystals are found in the

basalts

basalts at Bolsenna, which are like those that abound in the lava of Iceland and Italy. And lastly, a kind of stone near Langarnas in Iceland, which was much coarser, and more glassy than the common basalts, and evidently was lava burst into polyedrous and regular figures, though not quite so regular as the above-mentioned pillars.

What I have here said, might easily induce one to imagine that the basalt, after having been melted, and was grown again, had been burst into such pillars. But two objections, which you raise against this opinion, are difficult to be removed. First, this matter melts so easily, that it becomes glass without difficulty, before the blow-pipe for assaying, whence it seems that this mass must necessarily have been changed to glass, if it had been exposed to so great a fire as that of an eruption. But may one safely judge of an experiment made in miniature before the blow-pipe of the workings of Nature at large? Might not, perhaps, an addition we are unacquainted with, have prevented the
mass

mass from becoming glass, and cause it to break into these regular figures, though we cannot now determine wherein this addition consisted? Secondly, we find that the trapp* in West-Gothland, which both in appearance and substance so much resemble basalts, though it does not form itself into pillars, stands on slate; and how could this trapp have been formed by the fire, without, at the same time, kindling the bed, which is of so combustible a nature? But should not, perhaps, the fire be able to form the trapp into pillars? Perhaps all basalt pillars may have been a mass of trapp in the inside of the earth, which, having been liquified during an eruption, was thrown up, and split into pillars? But, Sir, I fear to fatigue you with my conjectures and questions; it would, however, be very agreeable to me and other naturalists, if you would kindly communicate to us your thoughts on this subject. This would, no doubt, enable us to judge with more certainty

* A kind of stone in Linn. Syst. Nat. Mineralogy.

of basalts, which at present engages the attention of the curious in general, and all naturalists in particular.

ACCOUNT of the Island of STAFFA,

COMMUNICATED

BY JOSEPH BANKS, Esq.

IN the fount of Mull we came to anchor (August 12, 1772) on the Morvern side, opposite to a gentleman's house called Drumnien: the owner of it, Mr. Macleane, having found out who we were, very cordially asked us ashore, : we accepted his invitation, and arrived at his house; where we met an English gentleman, Mr. Leach, who no sooner saw us, than he told us, that about nine leagues from us was an island, where he believed no one even in the highlands had been, on which were pillars like those of the Giant's Causeway: this was a great object to me who had wished to have seen the causeway itself, would time have allowed: I therefore resolved to proceed directly, especially as it was just in the way to the Columb-kill; accordingly having put up two days provisions, and my little tent, we put off in the boat about one o'clock for our intended voyage, having ordered the ship to wait for us in Tobir-more, a very fine harbour on the Mull side.

At nine o'clock, after a tedious passage, having had not a breath of wind, we arrived, under the direction of Mr. Macleane's son and Mr. Leach. It was too dark to see any thing, so we carried our tent and baggage near the only house upon the island, and began to cook our suppers, in order to be prepared for the earliest dawn, to enjoy that which from the conversation

tion of the gentlemen we had now raised the highest expectations of.

The impatience which every body felt to see the wonders we had heard so largely described, prevented our morning's rest; every one was up and in motion before the break of day, and with the first light arrived at the S. W. part of the island, the seat of the most remarkable pillars; where we no sooner arrived, than we were struck with a scene of magnificence which exceeded our expectations, though formed, as we thought, upon the most sanguine foundations: the whole of that end of the island supported by ranges of natural pillars, mostly above fifty feet high, standing in natural colonades, according as the bays or points of land formed themselves: upon a firm basis of solid unformed rock, above these, the stratum, which reaches to the soil or surface of the island, varied in thickness, as the island itself formed into hills or vallies; each hill, which hung over the columns below, forming an ample pediment; some of these above sixty feet in thickness, from the base to the point, formed by the sloping of the hill on each side, almost into the shape of those used in architecture.

We proceeded along the shore, treading upon another Giant's Causeway, every stone being regularly formed into a certain number of sides and angles, till in a short time we arrived at the mouth of a cave, the most magnificent, I suppose, that has ever been described by travellers.

The mind can hardly form an idea more magnificent than such a space, supported on each side by ranges of columns; and roofed by the bottoms of those, which have been broke off in order to form it; between the angles of which a yellow stalagmitic matter has exuded, which serves to define the angles precisely, and at the same time vary the colour with a great deal of elegance; and to render it still more agreeable, the whole is lighted from without; so that the farthest extremity is very plainly seen from without, and the air within being agitated by the flux and

reflux of the tides, is perfectly dry and wholesome, free entirely from the damp vapours with which natural caverns in general abound.

We asked the name of it; said our guide, The cave of Fiuhn: what is Fiuhn? said we. Fiuhn Mac Coul, whom the translator of Ossian's works has called Fingal. How fortunate that in this cave we should meet with the remembrance of that chief, whose existence, as well as that of the whole epic poem, is almost doubted in England!

Enough for the beauties of Staffa; I shall now proceed to describe it and its productions more philosophically.

The little island of Staffa lies on the west coast of Mull, about three leagues N. E. from Jona, or the Columb-Kill: its greatest length is about an English mile, and its breadth about half a one. On the west side of the island is a small bay, where boats generally land: a little to the southward of which the first appearance of pillars are to be observed; they are small, and instead of being placed upright, lie down on their sides, each forming a segment of a circle: from thence you pass a small cave, above which, the pillars now grown a little larger, are inclining in all directions: in one place in particular a small mass of them very much resemble the ribs of a ship: from hence having passed the cave, which if it is not low water, you must do in a boat, you come to the first ranges of pillars, which are still not above half as large as those a little beyond. Over against this place is a small island, called in Erse *Boo-sba-la*, separated from the main by a channel not many fathoms wide: this whole island is composed of pillars without any stratum above them; they are still small, but by much the neatest formed of any about the place.

The first division of the island, for at high water it is divided into two, makes a kind of a cone, the pillars converging together towards the centre: on the other, they are in general laid down flat; and in the front next to the main, you see how beautifully
they

they are packed together; their ends coming out square with the bank which they form: all these have their transverse sections exact, and their surfaces smooth, which is by no means the case with the large ones, which are cracked in all directions. I much question, however, if any one of this whole island of Boo-sha-la is two feet in diameter.

The main island opposite to Boo-sha-la, and farther towards the N. W. is supported by ranges of pillars pretty erect, and though not tall (as they are not uncovered to the base) of large diameters; and at their feet is an irregular pavement, made by the upper sides of such as have been broken off, which extends as far under water as the eye can reach. Here the forms of the pillars are apparent; these are of three, four, five, six, and seven sides; but the numbers of five and six are much the most prevalent. The largest I measured was of seven; it was four feet five inches in diameter*. The surfaces of the large pillars in general are rough and uneven, full of cracks in all directions; the transverse figures in the upright ones never fail to run in their true directions: the surfaces upon which we walked were often flat, having neither concavity nor convexity; the larger number however were concave, though some were very evidently convex: in some places the interstices within the perpendicular figures were filled up with a yellow spar; in one place a vein passed in among the mass of pillars, carrying here and there small threads of spar. Though they were broken, and cracked through and through in all directions, yet their perpendicular figures might easily be traced: from whence it is easy to infer, that whatever the accident might have been that caused the dislocation, it happened after the formation of the pillars.

* As Mr. Banks's measurement and dimensions of these and other remarkable pillars, and of Fingal's Cave, agree even to a single figure with those given by our accurate Author in pages 277, 278, 279, 281, 282, of this work, the repetition of them would have been useless; for which reason they are omitted.

From hence, proceeding along shore, you arrive at Fingal's Cave, which runs into a rock in the direction of N. E. by E. by the compass.

Proceeding farther to the N. W. you meet with the highest range of pillars, the magnificent appearance of which is past all description: here they are bare to their very basis; and the stratum below them is also visible: in a short time it rises many feet above the water, and gives an opportunity of examining its quality. Its surface is rough, and has often large lumps of stone sticking to it, as if half immersed; itself, when broken, is composed of a thousand heterogeneous parts, which together have very much the appearance of a lava; and the more so, as many of the lumps appear to be of the very same stone of which the pillars are formed: this whole stratum lies in an inclined position, dipping gradually towards the S. E. Hereabouts is the situation of the highest pillars. The stratum above them is uniformly the same, consisting of numberless small pillars, bending and inclining in all directions, sometimes so irregularly, that the stones can only be said to have an inclination to assume a columnar form; in others more regular, but never breaking into, or disturbing the stratum of large pillars, whose tops every where keep an uniform and regular line.

Proceeding now along shore round the North end of the island, you arrive at *Oua na scarve*, or *The Corvo-rant's Cave*: here the stratum under the pillars is lifted up very high; the pillars above it are considerably less than those at the N. W. end of the island, but still very considerable. Beyond is a bay, which cuts deep into the island, rendering it in that place not more than a quarter of a mile over. On the sides of this bay, especially beyond a little valley, which almost cuts the island into two, are two stages of pillars, but small; however, having a stratum between them exactly the same as that above them, formed of innumerable little pillars, shaken out of their places, and leaning in all directions.

Having

Having passed this bay, the pillars totally cease: the rock is of a dark-brown stone, and no signs of regularity occur till you have passed round the S. E. end of the island (a space almost as large as that occupied by the pillars) which you meet again on the west side, beginning to form themselves irregularly, as if the stratum had an inclination to that form, and soon arrive at the bending pillars where I began.

The stone of which the pillars are formed, is a coarse kind of basalt, very much resembling the Giant's Causeway in Ireland, though none of them are near so neat as the specimens of the latter, which I have seen at the British Museum, owing chiefly to the colour, which in ours is a dirty brown, in the Irish a fine black: indeed the whole production seems very much to resemble the Giant's Causeway, with which I should willingly compare it, had I any account of the former before me.

Thus much we have taken from Mr. Banks's account of the island of Staffa—which Mr. Pennant assures the public in a note to his tour in Scotland (p. 269.) was copied from his Journal; concluding in these words: “I take the liberty of saying (what “by this time that gentleman, meaning Mr. Banks, “is well acquainted with) that Staffa is a genuine “mass of basalt, or Giant's Causeway; but in “in most respects superior to the Irish in grandeur.”

We think Mr. Pennant might have spared his reader this information, as Mr. Banks in his account informs us, that it is a Giant's Causeway formed of coarse basalt.

LETTER XXIII.

From Chevalier IHRE to Dr. TROIL.

Concerning the Edda.

Upsala, Oct. 1, 1776.

S I R,

ACCORDING to your request, I send you an answer to the objections made by Mr. Schloczer against my opinion of the Edda, which, together with a translation of my letter to Mr. Lagerbring, on the subject of a manuscript of the Icelandic Edda, is, as you know, inserted in that gentleman's Icelandic history.

It gives me great pleasure to find that my thoughts on these subjects have been examined by men of learning in Germany, by which means a number of false notions which had been formed on the subject and design of this book have been removed; and I am very happy to receive any objections

jections which may tend to convince me that I have been mistaken.

Though I now resume the pen, it is not so much with any immediate design to refute those objections which have been made against me, as to give those accounts and explanations which have been required of me, and which I think myself more capable of doing than any other person, as I can command the codex, whenever I think proper. Mr. Schloczer and I propose the same end to ourselves, namely, the investigation of truth.

Mr. Schloczer's first objection is, that I have not given a complete description of the manuscript, its size, &c. He is perfectly right in this point, and I will briefly endeavour to repair this difficulty ; but first, I must observe a diplomatic description was not so much required in that letter, as I had directed my attention more to the contents of the book than its external appearance.

I intended to shew what was the view of the author of the Edda in composing this work, what parts belonged to it, and which did not, where-

in our manuscript differed from Resenius's edition, whence the book had obtained the name of Eddee, &c. &c. and its diplomatical descriptions would have afforded no information in any of these articles. This letter was besides not addressed to any foreign man of learning, but to one of my learned countrymen, well versed in ancient literature, who had frequently had this manuscript in his own hands, and examined it, and was perhaps better acquainted with it than myself. It would have been very superfluous to tell him, it was written in antient characters, in the Icelandic language, on parchment.

But to oblige Mr. Schloczer, and perhaps many others, I will inform them that this codex, as I said before, is written upon parchment, the colour of which is dark brown, which may proceed partly from its old age, and partly perhaps from its having been long kept and made use of in the Icelandic smokey rooms. It is in very good preservation, and in general legible. It is true, there are some

some round holes in the parchment, but these seem to have been there at first, as no part of the text is lost by them. The size is a small quarto, one finger in thickness, containing fifty-four leaves and a half, or one hundred and nine pages, besides a white leaf before, and one behind, on which there are, however, some bad figures, of which these on the first represent Gangleri, with Herjafuher and Thrídi, who resolve questions. The characters are old, and when compared with many others, seem to prove, that the copier lived about the beginning of the fourteenth century. But all this is of very little importance. Mr. Schloczer believes his subsequent questions may give more light in settling the principal point, as they tend to discover who was the author of the Edda, and what really belongs to it.

He is therefore more curious to know what is contained in this codex. Mr. Schloczer believes he has so much more reason for putting this question, as I myself have hinted, that besides Demisagor, Koeniggar, and Liódsgreinir,

griemir, it contained a list of Icelandic lagmen, and a *langfedgatal* or genealogy of Sturleson's ancestors. He therefore desires to know if this codex is not a magazine of all kinds of Icelandic works, which have been accidentally collected into one volume, and bound together? I answer to this, if the case were thus, Mr. Schloczer might have expected from a man who acted with candour and some knowledge of the matter before him, that he would not have omitted this circumstance. I therefore now declare that there is nothing else in it, but what has already been mentioned; unless I add, that p. 92 and 93, after the author has described the general rules of poetry, and the nature of letters, and the copier has left half a blank page before he writes the names of all the different sorts of versification used in the Icelandic poetry, another hand has patched in a steganographical writing, of which I did not know what to make during a long time, and indeed I did not take great pains to decypher it.

I will,

I will however give a specimen of it: *dfxtfrb scrkptprks bfnfdktb skt pmnk-bxs hprks*. As I was reading in Vanly's *Bibliotheca Anglo Saxonica*, I accidentally met with a similar collection of consonants, with a key affixed to it, which shewed that the whole secret consisted in placing, instead of each vowel, that consonant which in the alphabet followed next to it; also instead of *a, e, i, o, u, y*, the letters *b, f, k, p, x, z*, were put; and according to this rule the afore-mentioned riddle signified, *Dextera scriptoris benedicta sit omnibus horis*.

I afterwards found the same kind of steganography mentioned in a little work ascribed to Rhrabanus Maurus, under the title of *De Inventione Litterarum*, and which is so celebrated on account of the proof contained in it of the runes of the Marcomans. After letters became more universally known among the people, the subtle Monks however, desirous of knowing something which the vulgar were unacquainted with, invented various mysterious ways of writing in this man-

manner, which they not only make use of among themselves, but introduced in their public writings. This taste met with admirers among our ancestors in Sweden, and thence we find so many kinds of what are called *villrunes*, which were unintelligible to the vulgar. See in Bautil, N^o 25, 205, 331, 361, 539, 568, 571, 572, 581, 648, 748, 767, 817, 819, 822, 1001, 1088, and many more in Vormius. Perhaps what we call among us *helsinges runes*, have also no other origin, as the greater part of them only differ from the common runes, by having the staff taken away. It is however remarkable that our gravers of runes even made use of this cryptographys in monuments erected to the memory and honour of the deceased.

It is further asked, if there are any external or internal traces of the copier having considered all the above-mentioned pieces, or at least the three first parts as a connected work?

The answer to this may be found in the title of the book, which is at length
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in the Goranson edition, and runs thus :

Bok thessi heiter Edda. Henne hever sam setta *Snorri Sturlo* s. epter theim hœlti, sem her er shípat. En fyrst fra Asum ok ymi; tharnaest skald skapar mal ok heiti marga hluta. Sidaz hœttartal, er *Snorri* hever ort um *Hakon* k. ok *Skula* Hertuga; that is, This book is called Edda; and has been composed by Snorre Sturleson, in the manner it now stands: viz. first of the ases and ymi, afterwards the language of poetry, and its appellations of various things. Lastly, a dissertation of the versifications Snorre made upon king Hakan and duke Skule.

I mentioned in my letter to Mr. Lagerbring, that the Rubric was written in a later hand; which is right so far as has been added after the Edda itself was begun, which may be seen by the narrow space left for it, so that it has forced the copier to bring the last line into that immediately preceding it. Besides, I clearly perceived that the manu-
script

script was very old, and that no reasonable eye-witness could believe it was written in 1541, as Mr. Schloczer conjectures. But as it had been written with red ink, which had preserved its colour better than the black, I then believed the hand had been somewhat younger; but as I have now very minutely compared the writing in the Rubric with that of the Edda, I think I may safely affirm, that they are both written by one and the same hand. From hence it follows, that he who copied the Edda considered the above-mentioned articles, and no others, as essential parts of it.

I am come to the principal question, whether Sturleson is the author of the Edda? Here Mr. Schloczer seems to have taken most pains, to prevent me from deceiving the learned world in this point.

Because Mr. Schloczer has found that most antiquarians express themselves with a kind of circumspection when they speak of the Edda and its author, and instead of positively declaring

Sturleson the author, as Arngrim and some others have done ; only say, *Creditur, existimatur auctor fuisse*: that is, he believes the matter to be at least dubious, if not totally groundless.

I will not insist upon it, that there is at least more affirmation than negation in these expressions, especially as it is usual, on mentioning an evidently false opinion, to add, *falso creditur*, or something similar. For Mr. Schloczer himself remarks very judiciously, that the opinion of these men is of very little importance, when they alledge no grounds for it. He therefore believes himself entitled to maintain with certainty, that Sturleson has falsely been thought the author of the Edda. To support his opinion, he mentions three arguments in different places, which I must now examine more closely.

The first argument is to be met with in p. 39, where Mr. Schloczer submits it to consideration, whether the serious Snorre, overcharged with state affairs, could be supposed to have had time, and did not think it beneath his dignity

nity to write *Aerarium poeticum*, and become the predecessor of Weinreich? Here I will only observe, that Snorre was not constantly lagman, and that he might have compiled this work before he obtained this dignity, or in the interval between the first and second administration of this considerable charge; and lastly, even in its vacancies. Neither Mr. Schloczer nor I are able to determine how much time the management of a lagman's office requires. They hold several yearly court-days or assizes, after which I have always understood that they are entirely free and disengaged; so that I may fairly infer that the lagmen are not troubled with the examination of tedious records, or are employed in any extraordinary works. We find many Icelandic lagmen who have been poets laureats in Sweden and Norway, as Marcus Skaggason, Sturle Thordarson, and others. If Mr. Schloczer's argument was conclusive, he might go still farther, and prove, that Sturle-son could neither have written the *Heimskringla*, or history of the northern kings, which required ten times more

more time, and more laborious disquisitions, than the Edda.

Mr. Schloczer founds his second argument on his believing it incredible, that any one in the golden age of poetry in Iceland should presume to advance such absurd things as I have done in my letter. He therefore believes the Edda to be a production of later times, when poetry was in its decline in Iceland.

To understand the whole force of this argument, it must be known, that Mr. Schloczer divides the Icelandic literature into three periods; the simpler period, from the beginning to the introduction of Christianity; the golden period, from the introduction of Christianity to the close of the thirteenth century, when the black death or the great plague, as well as the subjection of the Icelanders to the crown of Norway, checked the progress of poetry; and the last, from that period to the present. I will not strictly examine this division, tho' I cannot comprehend that the

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introduction of Christianity could contribute to the improvement of poetry ; and still less, if the digger-death, which raged in the middle of the fourteenth century, produced the same effect on the surviving poets, as on the cultivation of the country and its population. But this I am clear of, that any one who would attempt to class the Icelandic poets with any degree of certainty, must be perfectly well acquainted with their language, and be able to weigh the faculties of their minds against each other.

It signifies very little under what particular dynasty the poetry of the Chinese most flourished, so long as we are able to understand their poems without the assistance of an interpreter.

As to the passages of Icelandic poets, which I have quoted in different places, they prove not a tittle of what Mr. Schloczer pretends they do. For Lopt Gutormsson's verses are not in the Edda ; and though the other song is to be met with in Resenius's edition of it, yet it

is not in the Upsala manuscript. It is therefore not known to what period they belong; and they cannot by any means be made use of as proofs to shew, that Snorre was not the author of the Edda. It is highly proper to be well acquainted with a subject before one ventures to treat of it.

I will by no means presume to defend all the phrases I have made use of; though it is well known that custom has introduced them into every language, which were they translated into other languages, would not only lose their original beauty, but appear awkward and graceless. For example, it would not be believed that to tread the stars under foot signified to be exalted and happy; nor would any one be understood who would, to express a doubtful state of mind, call it hanging water. And these phrases, not to mention an infinity of others, were however in constant practice among the Latins.

But as to our ancient ancestors in particular, who indubitably originated

from the East, they no doubt brought their allegorical expressions from thence. And, in my opinion, the fondness of the ancients for riddles did not contribute a little to these metaphors in speech; for their merit frequently consisted in the most perverted expressions, which in process of time were revived and admired as beauties. We are not permitted the liberty to judge without distinction in mere matters of taste and genius, though they widely differ from what is practised in other nations.

Mr. Schloczer takes this third and last, and perhaps worst argument from the contradiction which I have observed between the Edda and Snorre's Heimskringla. I wanted to shew in my letter, that the ancients by their Asgard meant the town of Troy; and this I can prove, by the one having maintained the same things of Asgard as the other does of Troy. My opinion therefore is, that Troy and Asgard must necessarily signify one and the same place, unless we admit that Sturleson has contradicted himself. It

It may easily be apprehended, that what I have mentioned by no means implies that there was a contradiction between the Edda and Heimskringla, but only that the above cited place had been called by two different names. Mr. Schloczer cannot possibly be ignorant of the meaning of argumentationes ab absurdo.

Hitherto I have mentioned the arguments with which Mr. Schloczer endeavours to shew, that Sturleson is not the author of the Edda; but now to prove the contrary on my side, I will content myself with one single argument, which is of such a nature as to make all others unnecessary. In the superscription subjoined to our Codex, the copier roundly affirms Sturleson to be the author of this work; and his testimony is so much the more undeniable, as the nature of the copy itself proves, that it cannot be later than the 14th century; and that an Ice-lander had made it on the spot, who certainly would not have thought it worth his attention and time to copy a work, if he had not known the author of it.

That this was the general opinion of the Icelanders, I think, may be proved thus ; that though various conjectures are generally made concerning the author of an anonymous work, there are hardly any except Sturleson mentioned as the author of the Edda.

I cannot on this occasion pass over in silence what I have read in p. 326 of the Danish Journal, which Mr. Lilie published in 1756 ; namely, that the celebrated Arnas Magnaus, in a written account left us by Sumundr Trode, was of the same opinion as Mr. Schloczer, that Sturleson was not the author of the Edda.

The arguments which he makes use of seem to carry some weight with them ; that in the last part of the Edda, called *Liodsgreinir* or *Skallda*, Sturleson is not only quoted, but also recommended as a pattern to the poets ; and that in this part mention is likewise made of the kings Hakan Hakanson, Magnus, Erich, and Hakan Magnussen, who all lived later than Snorre. This argument at first sight seems to be decisive, but loses its whole

whole force upon a nearer examination. The true state of the matter is this :

In the beginning of *Liodsgreinir* the author of the Edda says, that he has three different heads to treat upon; viz. the rules of poetry, its licences (*licentia poetica*), and its faults (*vitia carminum*), *settning*, *leife*, and *syrer-bodning*. The two first of these subjects are perfectly discussed in the *Liodsgreinir*, but the last is wanting. A later writer has attempted to make up this deficiency, and has therefore made a supplement to Sturleson's Edda. It is not in the least extraordinary that he should have mentioned Sturleson, and given him his merited share of praise; but that this supplement does not belong to the genuine Edda, is proved by the Upsala manuscript, where it is entirely wanting.

In this manner it may be explained what is said of the late kings: they are never mentioned in the Edda; and I am much mistaken if Arnas Magnus has not taken them from the *Skaldetal*, or list of poets, where they

are all taken notice of. This *Skaldetal* was no more than a supplement to the Edda, as I shall make appear presently. If therefore the learned Magnaus had ever seen our Codex, he certainly would not have entertained this opinion.

In regard to these appendixes, I am perfectly convinced that the catalogue of *Lagmen* and the *Langfedgetal*, or genealogy, are the works of Sturleson himself. The subject contained in them refers entirely to Snorre, who was both Lagman and a descendant of the Sturlunga family. The *Aettartal*, or genealogical table, which from the beginning descends in a strait line from the fathers and mothers side to the sons, at Sturle extends to all the children, and daughters children; yet in some instances even there not to all these, but most probably to those only who were alive when this genealogical table was composed. The same is to be observed in the catalogue of the *Lagmen*, where it is very accurately mentioned how long every one of them possessed their place: but at
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the family of Snorre the catalogue stops without observing how long they maintained this charge the last time. It is therefore impossible that this genealogy should have been composed before Snorre's time; nor is it less improbable that any one should have omitted in later times to add the sixteen years during which Snorre was Lagman the last time; or that he should have forgot to mention this circumstance of him in the whole list of Lagmen, who was the most considerable of them all.

I will in this place add, that it was very common, not only in the North, but even in other parts, to subjoin such lists, genealogical tables, and the like, to larger works, in order to rescue them from oblivion, and prevent their being totally lost to posterity. In the same manner the copier of our West Gothic law had added to it a *Konunga Längd*, or list of kings, as likewise a list of the bishops of Skara and Lagmanner in West-gothland. Are Frode has in like manner affixed his genealogy to his Schedis,

Schedis, or *Islandiga bok*, and several others.

It is more difficult to determine something conclusive concerning the the third appendix, or *Skaldetal*. I have always been of opinion, that it was begun by Snorre, as it commonly follows the Edda, and that it was afterwards augmented by one or more persons: Vormius did the same by a poem written by Saxo Hiærne, who obtained by that composition the regal dignity in Denmark, though as a Dane he was not properly intitled to be placed in the list of Icelandic poets.

That this catalogue was the work of several hands may in my opinion be perceived by more than one indication: immediately in the beginning it is said, that Starkotter was the first of the Skalds, whose verses the people had learned by heart; and in the end a certain *Ulfver hin Oarge* is cited as the first, who, according to Mr. Schoning, lived in the second century, and consequently must have been several centuries older than the above-mentioned Starkotter. These two accounts

accounts can hardly be supposed to proceed from one and the same author.

It is besides incontrovertible, that what is said of the last Norwegian kings corresponds not with the time of Snorre. It would be of essential service if a man of Mr. Suhm's merit and abilities would critically examine this Skaldatal, and compare it with Vormius's list of poets, which differs so widely from it in several points.

This at least may be perceived by every one, that the Skalds therein mentioned have not all lived in the thirteenth century; but that a great part of them existed in the tenth, eleventh, and twelfth centuries. The 230 Skalds, who, according to Mr. Schloczer's reckoning, lived in the thirteenth century, may be considerably reduced in number, by one and the same Skald being mentioned in three or four different places, as if he had been in the service of as many masters. It is very remarkable that some of these Skalds, as Oltar Svarte, Sigvatur Thordarson, and others, have been received

received as poets laureats in all the three northern courts.

Nor is it less remarkable that some of these Icelandic Skalds were taken into pay at the English court, by kings Athelstan and Ethelred: this would require an examination to discover how their *Skaldskaparmal*, or poetical language, could be understood in a foreign country, as both languages, without these poetical figures, differ so widely from each other, as is evident from the remains of both.

It is lastly asked, if there are any internal or external marks, from which it might be guessed that the three parts of the Edda mentioned by me belong together, and form one work? But this question is answered by the title quoted above, wherein all the parts are clearly enumerated.

In regard to the third part, called *Liotsfreinir*, Mr. Schloczer desires to know how this title suits to an ars poetica?

I have already in some measure answered this question in my letter to
Mr.

Mr. Lagerbring, by citing the strange titles the ancients sometimes prefixed to their books. However, that a clearer idea may be formed of what relates to this appellation, it should be observed, that Sturleson immediately in the beginning divides all sounds or tones into three kinds. The first he calls *vittlaus bliod*, or the sound of inanimate things, as of thunder, waves, wind, and the like; to the second he reckons the sounds of irrational animals; and to the last, the articular sounds of men, which are produced by means of the tongue, the palate, &c. He then speaks of the sound of the letters, how some are long, others short; some consonants, and others vowels and diphthongs: he then proceeds to the rules of prosody, and whatever else belongs to the Icelandic *skaldskap* or poetry.

From hence it may be seen what has given rise to this appellation; *Liodsgreinir* literally signifying no more than distinction of sounds. Sturleson has given as strange a title to
this

this Northern history, which he calls *heimskringla*, and this from no other reason, but because it was the first word with which the book began.

LETTER

LETTER XXIV.

From Chevalier BACK to Dr. TROIL.

Of the Icelandic Scurvy.

Stockholm, June 12, 1776.

S I R,

THE accounts with which you have favoured us of the diseases which mostly abound in Iceland must be of universal service to the Swedes. When I had the pleasure and happiness of conversing with you on this subject, my attention was peculiarly raised by the information you gave me of the Icelandic scurvy, and of its dreadful consequences on those persons who were affected with it.

What Mr. Petersen calls the Icelandic scurvy, is the true elephantiasis, which is nearly related to the leprosy. Celsus has described it in the days of Augustus under the name of elephantiasis; and yet Aretæus has treated more fully upon it, in sect. 5, under the
same

same name. It is more terrible than any other disease, producing frequently a dreadful end: it gives a disgusting appearance to the patient, as the body by its colour, roughness, and scaly appearance, resembles the skin of an elephant. Whoever compares your description and Mr. Peterfen's of this disease with that of the ancients, will not find it an easy matter to take the Icelandic scurvy for any thing else but the elephantiasis. In my opinion, both Ettmuller and Boerhaave, and his famous commentator baron van Swieten, would have done better not to call the elephantiasis the highest degree of the scurvy; or if they had not confounded those two diseases, so different in their beginning, progress, nature, and remedies.

Those among us who have written of the theory of diseases, have with more propriety given the name of scurvy where a gradual increasing languor takes place, together with a bleeding, stinking and putrid breath, and many coloured blackish-blue spots on the
body,

body, particularly round the roots of the hair, and which principally proceeds from corrupted salt animal food, and the want of vegetables. The elephantiasis, on the other hand, which is also called *Lepra Arabum*, is rather an hereditary disease; the skin becomes thick, unequal, glossy, and loses its smoothness; the hair falls off, languor and want of feeling take place in the extremities: the face becomes disgusting and full of biles, and the patient gets a hoarse nasal voice. In the real leprosy (*impetigo, lepra Græcorum*) the skin becomes wrinkled and full of scales, which seem to be strewed with bran, often burst, itch exceedingly, and are filled with a watery moisture.

Mr. Sauvage mentions several sorts of elephantiasis; but it is a question whether they all differ or not, as he might have multiplied their number. I believe that the elephantiasis mentioned by Cleger in his *Eph. Nat. Curios.* and Sauvage's javanese elephantiasis are very like the Icelandic. At least it is certain that the elephan-

tiafis in Madeira, which Dr. Thomas Heberden describes in the first volume of his Medical Transactions, almost one hundred years after Cleger, is entirely the same.

It is very remarkable that this disease has preserved its nature so perfectly in the most northern parts during more than a hundred years, and remained intirely fimilar to that in the hottest climates. It appears the same disease, at Martigues in Provence, has been described by Dr. Johannes in the first volume of the Medical Observations and Inquiries; and that it has been in the Ferro islands, may be seen in the first volume of Bartholin's Actis Hafn.

The disease observed in Norway, which Mr. Anthony Rob. Martin describes in the Transactions of the Swedish Royal Academy of Sciences, in the latter end of the year 1760, may likewise be reckoned amongst this class; as also that which appeared in several parts of Sweden, and of which Mr. Assessor Odhelius gives an account in the third part of these Transactions

actions for the year 1774; all these may very properly be compared to Mr. Sauvage's Elephantiasis Legitima.

It was believed in the most early times, that this disease had taken its rise in Egypt; but Lucretius positively says, that it was first discovered on the Banks of the Nile. In Celsus's time it was not at all known in Italy; but Pliny relates, that it was first brought into that country by the army of Pompey, from Egypt and Syria, but did not remain there long. In the twelfth century it was brought to Europe the second time by the Crusaders, and is frequently mentioned in the publications of the thirteenth, fourteenth, and fifteenth centuries: it was not however very violent in the fifteenth and sixteenth centuries; and in the seventeenth century it seems to have entirely disappeared in England, France, and Italy, when all the Lazar-houses, which had been built on purpose to receive patients infected with this disease, became useless.

But how did this dreadful disease come from the South, where the dis-

eases connected with an eruption are most frequent, so far to the North? Could it not also have happened by means of the Crusades, our forefathers in the North having had likewise the honour to partake of them? nay, even the Icelanders were not excluded from a share. The oldest Iceland writings give us examples of the elephantiasis in Norway, and other northern countries, as may be seen in the first volume of Olafsen's Voyage to Iceland, page 172. But it still remains a query, whether it was the true scurvy or not, which the learned author found mentioned for the first time, under the antient Norway and Icelandic name of *skyrbjugur*, that appeared in the Norway fleet, in the year 1289, during the war of king Ehrick with Denmark. For according to Mr. Peterfen's testimony, the word *skyrbjugur* is to this day frequently made use of to express the elephantiasis; though I must confess that the scurvy seems to be a common disease among the fleets in those days as well
as

as in ours. However it would be useful for the history of the diseases common in the North, if the origin of them could be determined from these old accounts, especially as these accounts of the scurvy are two hundred years older than any we have been yet able to discover. We may most probably expect this discovery from our neighbours in Denmark and Norway, who elucidate the northern history from ancient accounts with so much zeal and happy success.

Mr. Anthony Rob. Martin relates, that in the above-mentioned place the number of persons in Norway infected with this disease, in the year 1759, amounted to 150, for whom three hospitals were erected; and Mr. Peterfen fixes the number of those who were ill of it in Iceland in the year 1762 at 280 persons, for whom four hospitals were established.

You may ask, Sir, how this disease came to be so firmly rooted in Iceland, as it has so decreased in the South, that it has almost disappeared there?

I believe that this is not so much owing to the climate as to the manner of life and diet. People whose continual occupation is fishing, are night and day exposed to wet and cold, frequently feed upon corrupted rotten fish, fish livers and roe, fat and train of whales, and sea-dogs; as likewise congealed and stale sour milk: they often wear wet cloaths, and are commonly exposed to all the hardships of poverty. The greater number of these are therefore to be met with in this class: on the contrary, where less fish and sour whey are eaten, and more Icelandic moss (*lichen Islandicus*) and other vegetables, this disease is not so prevalent, according to an observation made by Mr. Petersen in the above-mentioned Transactions.

We have a very remarkable instance of the great effects of diet on the diseases of a nation, in the inhabitants of the isle of Ferro. Since fishing has declined among them, and the inhabitants have cultivated corn, and live upon other food instead of whale's flesh and bacon,

bacon, the elephantiasis has intirely ceased among them, according to Mr. Peterfen's account. Things bore a very different aspect there ten years before this alteration: as a proof, I will quote Mr. Debe's own words from the first volume of the Act. Hafn. pag. 98. *Elephantiasis in insulis Ferröensibus frequens ex victu et aëre, has habet notas; facies et artus hic fere ubique foedantur tumoribus plumbei coloris, qui exulcerantur foedum in modum. Rauci sunt hoc morbo infecti, et per nares vocem emittentes. Vere et autumno invalescens morbus plurimos enecat.*

Experience likewise teaches us, that the greater number of persons labouring under this disorder in our country reside near the sea-shore, in the districts of Abo and Oesterbottn, and in the isles scattered round the shore, who in general get their livelihood by fishing and catching sea-dogs: from what has been said before it may be learnt what is proper to be done gradually to remove this destructive disease. But I will reserve

for another occasion, whatever relates to this disease in Sweden.

About a hundred years ago plagues and pestilential fevers raged in Europe, as may be seen in the accounts of several physicians of the epidemical fevers which prevailed at certain times. But at present, when a better police has procured us more cleanliness in the streets and narrow lanes; and more neatness is observed in our apparel and habitations; as also since beer prepared with hops, wines, and other liquors are drank, which are very salutary, though they produce other diseases when made use of in excess; since fruits and vegetables, tea and sugar, are become fashionable; these and similar disorders are greatly diminished. Sir John Pringle proves the truth of these remarks, accompanied with several examples, particularly with respect to the diseases of England, in his *Observations of the Diseases of an Army*.

It is very probable that the elephantiasis, and many other great disorders in the skin, quitted the southern coun-

countries from similar causes ; and have on the contrary maintained themselves towards the north, where a sufficient quantity of bread cannot be provided for the natives, and where the lower sort of people, who live entirely by fishing, do not eat any vegetable food, but only feed upon rancid oily victuals ; and are besides unable to keep themselves clean and neat, being continually exposed to wet and cold on the sea-shore, &c.

I should repeat the observations which have been made upon this disease in Iceland, as they might perhaps serve to make our countrymen better acquainted with the disorder itself, and the manner of curing it. But you, Sir, might perhaps tell me, that this is a more proper subject for a physical book than for letters concerning Iceland ; for which reason I will be as concise as possible.

Mr. Anthony Rob. Martin has given so exact an account of this disease, that I need not here enumerate its symptoms. Whoever compares it

it with Mr. Petersen's little dissertation, will become perfectly acquainted with the elephantiasis, its beginning, progress, and greatest height; and will readily allow, that the Icelandic name of *liktraa* is given it with great propriety, which signifies, that those who are infected with this disease in its highest degree, resemble a putrefying corpse more than a living man.

The elephantiasis is either inherited from the father or mother, who are afflicted with it, or it is not inherited. In the first case, the disease frequently appears before the child is two years old, and always before the age of 25, so that such persons seldom live to see thirty years. The sooner the disease makes its appearance, the sooner the patient becomes a prey to death. But those who have not inherited the elephantiasis, but have brought it upon themselves, by their mode of living and other causes, may drag on a wretched existence during twelve or fourteen years, and sometimes longer. The elephantiasis is of the same nature in the South.

Before

Before this disease breaks out on any person, his breath is disagreeable and stinking for three, and sometimes six years preceding: he has a great appetite to eat four, half-rotten, and unwholsome food; is always thirsty, and drinks very much: some are slothful and sleepy, and when asleep are with great difficulty awakened; are short-breathed when the complaint ascends upwards; they spit very much, and complain of weariness in their knees. They shiver violently when they come out of a cold room into the open air; the eyes and lips become of a brown and blue colour: they have a weak smell; with some the feeling is likewise numbed; others have weak sight; and some lose it entirely, when their foreheads begin to swell in the beginning of the disease. They have frequently thin hair, particularly on the eye-brows; the beard likewise grows very thin on both sides of the chin, and the skin becomes glossy, as if it had been rubbed over with grease.

This

This disease is not found to be particularly infectious in Iceland: as a husband afflicted with it does not infect his wife, nor a diseased wife her husband. The children may likewise be brought up without danger in the house of their diseased parents. But it has been found by experience, that when one of the parents is infected with it, some one or other of the children always catch it. It is the same thing in Madeira, as Dr. Heberden observes. Dr. Johannes informs us that at Martigues in Provence, when one of the parents has the disease, one of the children or grand-children, or a descendant in the third degree, is certainly infected with it; but in the fourth degree it again disappears, and only shews itself in a bad breath, hollow teeth, swelled throat, and a darker colour than usual.

The more ancient writers who have treated of this disease, frequently relate, that people were even afraid of being infected by conversing with those who were troubled with it. The disease must therefore either have been
more

more violent in the beginning, and in the southern countries, as the venereal diseases were formerly in the beginning of the infection ; or the disease having but lately made its appearance, caused more apprehensions. It is, however, always adviseable to be cautious in conversing with such patients, and neither to wear their shoes or cloaths, when they have been rendered wet with sweating. When the disease is arrived at so high a pitch that the matter which flows from the skin is corrosive, and eats into the flesh, it can no longer be denied, but that it then becomes infectious, and even dangerous to converse too near with the patient.

As the elephantiasis, when it has attained its greatest height, is incurable, according to the testimony of ancient and modern physicians ; it is so much the more necessary to notice the beginning of the disease, and the time preceding it, in order to prevent the danger.

A patient who finds himself in these circumstances, or lives in a place where
the

the disease is rife, or has any other cause to believe that he has the least vestige of it existing in his body, either by inheritance, or through his own fault, should, both in his diet and in his whole manner of life, avoid whatever is likely to contribute to it, or render his body more liable to receive the infection, with the utmost caution. He must keep himself extremely clean ; immediately put on dry cloaths, whenever those on his back become wet ; eat no other food but what is easily digested, and abstain from all oily rancid whale's flesh, and the like. He must eat no half-rotten fish ; nor their intestines and livers, especially if they are in a putrid state : on the contrary, he must confine himself to bread, roots, green herbs, cabbages, turnips, and salad of gentiana, campestris, sorrel (*rumex acetosa*, L.) *rumex crispus*, &c. &c. He must eat soups, boiled fresh meat, with scurvy-grass, sedum acre, and the like. He must make use of baths of the decoction of juniper, dry baths of juniper, &c. &c. In the same manner antimonial remedies would be very useful ;

useful; and even Swieten's mineral mixtures, pills of an extract of hemlock (*pilulae alterantes Plumiris*), and *ledum palustre*. I have likewise observed with pleasure, that a girl in the parish of Wester Hannings was cured of a commencing elephantiasis in the year 1774, by making use, during a long time, of Huxham's antimonial essence, with a decoction of antiscorbutic herbs.

But every one will easily apprehend, that poor wretched people, who are naturally most exposed to these and the like diseases, are likewise entirely incapable of averting them by observing a proper diet and manner of life, which are, however, almost the only remedies. Besides, these kind of people are generally careless of any illness so long as they are able to stir; they likewise seldom consult a physician, and when they do, it is out of their power to follow his prescriptions exactly. Some persons attacked with it have, however, been freed of it, after having had the small-pox. It might, therefore, be conjectured, that patients afflicted

afflicted with the elephantiasis, if they had not had the small-pox, would be benefited by inoculation.

Some who have had this dreadful disease have gone from Iceland to Copenhagen, where they have happily experienced a cure. I will likewise mention, in justice to Dr. Thomas Heberden, that he is the only physician known to have cured the elephantiasis, after it had attained a very high degree. His manner of cure is this: he first mixes an ounce and an half of powder of bark, with half an ounce of saffra root, and then adds as much simple syrup as is necessary to make the whole into an electuary; of which he gives the patient two portions a day, of the size of a nutmeg: he causes the hands and feet to be rubbed morning and evening with a mixture, consisting of eight ounces of brandy, an ounce of lye of tartar, and two ounces of spirit of sal armoniack. He lastly causes blisters to be constantly laid between the shoulders. This method regularly pursued succeeded in the course of five months,
after

after he had before made use of antimony, mercury, and the like, during the full period of seven years, without any lasting amendment. But I have already said too much of this loathsome disease.

Sed quænam medela excogitari poterit, quæ elephantem tam ingens malum expugnare digna sit? *Areteus.*

L E T T E R XXV.

From Professor BERGMAN to Dr.
TROIL.

*Of the Effects of Fire, both at the
Volcanos and the hot Springs; and
also of the Basalts.*

Stockholm, June 12, 1776.

S I R,

YOU have been so kind as to communicate to me your observations on Staffa and Iceland, and to desire my opinion of their natural curiosities. It would be very ungrateful if I hesitated to comply with this request, as you presented me with the intire collections you made there, that I might chemically examine the nature of each. Mere observations, without the assistance of an exact knowledge of the substances, in respect to their original matter and composition, instead of affording any sufficient lights whereby to enable us
to

to determine with certainty of them, would only lead us to draw very erroneous conclusions. Though the form, grain, colour, hardness, position, and external appearances may assist us in our conjectures of the true nature of minerals, and sometimes of the manner in which they are produced, yet we must nevertheless remain in uncertainty, till proper experiments guide us to a more clear decision.

Forgive me for mentioning the conclusions, which, in my opinion, might be drawn from your observations, regarding the internal nature of these substances, so far as I have been able to discover them from actual experiments. But you must by no means expect a solution of all the difficulties that arise on this intricate business. I will cautiously endeavour to separate what is certain, from what has been hitherto considered precarious and doubtful; a due regard to truth will always prevent me from offering mere conjectures, or even credible opinions, with a peremptory

Y 2 decision,

decision, as incontrovertible arguments. Experience has taught us that we ought to judge of the works of nature with the utmost diffidence; and we do not want examples, even from the remotest times, of persons who have pretended to explain, with the most positive certainty, not only how our earth, but even how the whole world received its present form, and even its very origin. To determine the contrivance of so vast a machine over a writing-desk, is indeed one of the most daring enterprizes which the proud reason of man ever proposed to itself; and, more than any other attempt, shews his weakness and arrogance. All these imaginary systems have been by little and little overturned, though the greatest pains were exerted to compare them with nature, and examine their existence. Their arguments were then discovered to be founded on a few insufficient observations, or, what is still worse, on uncertain, and sometimes evidently false principles.

You,

You, Sir, will therefore readily excuse my timidity; for instead of endeavouring to discover all at once, as it were *à priori*, though without any certainty, the manner in which nature works, and forms things in secret, I prefer the more laborious method of discovering it gradually with certainty, by experiments founded on due observations; and shall not hesitate to confess my ignorance, wherever these guides in the study of nature cease their instructions. I do not, however, reject all conjectures and proposed opinions, whenever they lead to new researches, provided they are offered as mere conjectures, and not obtruded on us as certain truths, or determined opinions.

From what I have hitherto said, you will, I believe, conceive my method; therefore I shall enter upon the subject, and briefly treat of it under separate heads, in the following manner.

Of the Hot Springs.

YOUR description of the Icelandic springs, the most extraordinary which have hitherto been discovered in the known world, was extremely agreeable to me, partly on account of the surprizing force of them, and partly on account of the great light obtained in mineralogy by the crustated stones formed in them. How these springs may be accounted for, I hope I have sufficiently explained in another place *; I shall, therefore, entirely pass it over here. But now I will communicate to you what I could not then understand, namely, the true nature of these depositions.

You have presented me with the following substances from the Geyser :

1. The substance of which the water has prepared itself a basin to run from.—It consists of a hard, rough, greyish, and irregular flaty, and generally martial crustated stone, over which a covering of small crystalli-

* In my *Physika beskrifning om Jordklotet*, ult. edit.

zations has formed itself, that resembles the lichen fruticulosus, or rather the Stahlsteindruse found in the Welter silverberg; that is called the flos ferri or Eisen bluthe. These precipitations are opaque, without of a whitish grey, blacker within, and plainly shew the formation of several crusts on one another. Each of these flos ferri, as well as the crustated stone, has the hardness of a flint; however they are not so compact or strong as to strike fire with the steel.

The strongest acids, the fluor acid not excepted, are not sufficient with a boiling heat to dissolve this substance. It dissolves very little if at all by the blow-pipe with the fusible alkali, a little more with borax, and makes a strong effervescence with sal sodæ. These effects are peculiar only to a siliceous earth, and therefore there remains no doubt concerning the real nature of this crustated stone. Nevertheless I have melted it in the crucible; first, by weight, with half as much alkaline salt, and likewise with three times as much;

and have obtained in the first case a fixed glass, and in the second one, which, in dissolving, yielded a common liquor silicum. The glass of the crustated stone is of a more yellowish brown than that of the crystallizations; and this difference is caused by the greater quantity of iron particles.

2. The porous crustated stone or sinter, which is found in the moor surrounding the border of the basin, is light, whitish, and here and there spotted with a rust colour: it is evidently an incrustation upon moss and similar substances, which have been decayed by length of time, and left those cavities. In regard to its composition, it is of a siliceous nature as the preceding, and also perfectly similar in respect to fire and dissolvents.

I have already mentioned the solution of the flint in sal soda with the blow-pipe; and as I shall hereafter have frequent occasion to refer to it, I will in this place relate the whole process. The late director of the mines (*bergmastare*) Mr. Cronstedt, makes mention of this
salt

salt in his Mineralogy, but it is very seldom; and he considers it as less proper for using with the blow-pipe, because it is too soon imbibed by the coals. It certainly does not afford a very good solution upon coals, and I therefore made use of a silver spoon, made on purpose; by which method I have been able to make good use of the *sal fodæ*, which in his examinations of the different kinds of earth in this manner, is very serviceable, and even indispensably necessary, as I shall hereafter prove more at large, in a little dissertation on the blow-pipe, and its proper use.

I have frequently inserted a supposition in my printed works, that though the siliceous earth cannot be dissolved in the usual manner in water, yet it might with the help of a great degree of heat: and that this really happened at the Geyser, is evidently proved by the above described crustated stone. The hot water forms of itself the large siliceous basin from which it issues out of the substance, that is in a dissolved

dissolved state at the first, but quickly precipitates on account of the heat decreasing in the open air. The heat of the water was not examined with the thermometer, till such time that the basin was filled, when it was nevertheless found at a hundred degrees, according to the Swedish measure. It is in all probability much greater under the earth; for its running through cooler channels, and its spouting afterwards into the air to a great height, must necessarily very much diminish the heat on account of the great dispersion.

This quick deposition produces both the opacity and irregular form of this stone, and prevents the particles from being so closely united, as might have been expected from the degree of the hardness of each, supposing the solvent power had diminished more gradually.

Mr. Scheele has discovered the formation of the flint; and I myself have found out, within these two years, a method of obtaining, with the help

of some fluor acid, thirteen precipitated crystals of the size of small peas. This artificial pebble in all experiments, both in the wet and dry method, and even in the focus of a burning-glass, in a piece that I sent to Mr. Macquer, discovered exactly to him the same qualities as the natural one.

All these circumstances, therefore, prove, that the pebble is a saline earth, which is composed of fluor acid, and an original substance existing in the watry exhalations. It is not quite simple; but however, I have not been able to consider it as any other than an elementary earth: indeed my judgment is, that it cannot be compounded from any other principle.

I do not in this place mean a finer or coarser powder, by the denomination of earth, as is generally understood under this appellation; but I take the word in a chemical sense, to express a fixed principle, which is obtained in analysing any substance, and that cannot be dissolved in boiling

ing water, after the nicest mechanical division. It is well known that the diffolubility of any substance may be lessened by certain compositions; and that a solvent can better attack the substance, according to the extent of its surface; and that lastly, water in an open vessel will not admit of any greater degree of heat than one hundred degrees, according to the Swedish thermometer. A substance may, by this rule, be diffoluble by itself, after having gone through a preparatory cleansing, or a chemical separation, or with the assistance of a greater degree of heat, though it might be indissoluble without any preparation, or with the usual method of boiling; and it is with a view to this circumstance that I call the flint a kind of salt earth.

I have likewise examined the substances you collected in the morafs near the Geyser, and have found them to be the following:

3. A dark-red bole, which became darker in the fire, but was afterwards a little attracted by the magnet. It

crumbles into pieces in the water, and is fine and tough to the touch.

4. A bluish-grey clay, which contains green vitriol of decayed pyritæ.

5. A brighter grey sort, which did not seem to contain any vitriol.

6. A white or yellowish clay, with rust-spots.

All these sorts become very hard in the fire, and take a good deal of time before they liquefy. The last, when it softens, is harsh and more sandy to the touch than the preceding sorts.

The different sorts of stone collected at Laugarnas are of another nature: nor does the water here spout out of a basin, but through many small openings in the earth.

7. A whitish irregular plated crust, which often grows on the outside into small globular blunt points. This in acids gives a sudden fermentation, that immediately ceases without its being any otherwise attacked. It dissolves with borax by the blow-pipe with great difficulty, and without motion, but with a loud effervescence with

with *sal sodæ*. It is consequently a siliceous mass outwardly covered with lime, and has fixed itself on the following substance.

8. A solid irregular plated and broken crust, of a dark colour, but in many places tinged with bright blue spots. It becomes quite smooth in cutting, almost like stone marble, but does not crumble in water, nor does it become soft in it; with acid it shews an effervescence which soon ceases; with the blow-pipe it grows hard, scarcely melts at the thinnest edges, and is attacked with some motion both by borax and fusible urinous salt and *sal sodæ*, but is not entirely dissolved by any of them.

9. The substance found at the bottom of the brook, which carries off the water that gushes out, is brown, spongy, and composed of pretty hard flakes and threads, that are covered with fine glassy crystallizations. These are clear only in some few places; but lose their brown colour, both in fire and marine acid, and become quite clear.

The small crystals puff up very much under the blow-pipe, almost like borax; they float in bubbles on the surface, and are dissolved with great difficulty by borax; they are attacked by sal sodæ with a strong ebullition: it is the same with the more solid flakes, but they do not puff up so strongly as the crystallization. These several qualities here mentioned evidently shew, that this crustated stone consists of zeolite.

10. From Reykum you sent me calcareous spar in lumps, that are externally rounded, as if they had been tossed backwards and forwards by the water, and rubbed against hard bodies. In them there are small greyish green crystallizations, that dissolve by the blow-pipe to a black slag; the sal sodæ causes some effervescence in them, but does not dissolve them; they are likewise attacked with some emotion by fusible urinous salt.

11. A loose, tubulose, whitish crustated stone, or an incrustation cavernous, and with impressions of
 3 leaves,

leaves, stalks, and the like. As to its nature it is filiceous; but seems at the same time to contain a different substance, as it dissolves more slowly with *sal sodæ*.

The spring which here bursts forth in a very sloping direction towards the horizon, according to your account, deposite a kind of sulphureous grease by its hot steam, on the cavities of the upper side; but I have found no specimen of this in the collection you communicated to me.

From what I have hitherto said, we may gather, that the Icelandic hot springs contain very different substances from what are to be met with in other places of the same sort, especially filiceous earth.

There is no lime at all near the Geyser; but at Laugarnas there are some faint traces of it, partly as an external covering, and partly as constituent parts in the zeolite, of which more will be said hereafter. The balls of lime found at Reykum are most probably thrown out by the spring,

spring, and have been rounded on the surface by the friction.

Of the Eruptions of Fire.

I HAVE in another * place treated pretty extensively of the dreadful devastations caused by subterraneous fires on the surface of the earth in many parts of the world, both in regard to their causes and effects; I have therefore not any thing to add in this place but what particularly relates to Iceland, and what may serve to explain the eruptions which have happened there from time to time.

Whether Iceland is to be considered as entirely produced by volcanos, is a question which most probably will remain unresolved many years. It is true, Sir, that according to the accounts you have collected there, the volcanos have raged in a great many places, and that the whole country is in a manner covered with traces of their destructive effects;

* Verlds beskrifn, § 149.

we also learn from undeniable facts, that new islands have been produced by volcanos in many places. But all this proves not any thing more than that the most dreadful effects have been produced by fiery eruptions in Iceland.

To determine this question, it would be indispensably necessary, that a naturalist should thoroughly examine all Iceland. If a granite, or any other stone or berg-art, was found in solid rocks, and not separate or in loose fragments, which may have been brought thither from distant parts, I should entirely dissent from your opinion. But before these and the like discoveries were made, I believe no conclusions could be drawn.

I may venture to maintain with more certainty, that your collection confirms what I before concluded from other reasons, viz. that in all volcanos pyrites are found, which on decomposing produce heat and fire; and likewise slate that, penetrated with bitumen, serves to feed the fire.

12. The slate which you have brought from Iceland splits into thin plates, which discover many sorts of impressions, particularly of leaves; the colour is black, and it is exactly of the same nature as the common aluminous slate.

13. The two pieces of furturbrand, or fossil wood, which you brought with you, bear evident marks of a vegetable composition; and I may almost affirm, with perfect certainty, that the largest is a kind of pinus abies; on the outside are barks and branches, and in the inside all the rings of the sap appear: the lesser is a piece of rind without wood; both are black, quite soft, easily take fire, and flame in burning. After the flame is extinguished, one hundred parts afford forty-two parts of coals, which after being only calcined yield two parts of yellowish-brown earth, that is attracted by the magnet, and partly dissolves with acids: it makes some effervescence with borax and fusible urinous salt; the sal sodæ
Z 2 also

also causes a little ebullition at first, but does not entirely dissolve it.

Your conjecture, Sir, concerning the manner in which the furturbrand is produced, does not seem improbable. I have already observed a long time with surprize, that fishes, othoceratites, lituites, wood, &c. &c. which are to be found in slate, have been compressed or flatted, whilst they preserve their entire form and roundness in lime.

This same circumstance may be observed in the two pieces described above, especially in the larger, which is only an inch and a half in thickness, though it is nineteen inches in length, and thirteen in breadth. The outside of it has no marks of any roundness, but is quite flat. An exceeding great weight is required to press a stick to a flat plate; and I cannot conceive how the most immense beds, which must necessarily have been soft when spread over it, could ever produce this effect. The cause of this is yet undiscovered, and will probably remain so
5 a long

a long time; however something may be found there which seems to shew, that the bituminous slate has been produced in the same manner, as it has not only penetrated the substance of the slate, but every thing else which has been laid upon it, for it may yet be obtained by means of distillation. But by what means has this been brought thither? How could it be imbibed by the clay, in case this was under water, which however seems to be undeniable, from the prodigious number of marine animals which are found buried? and how could the inclosed bodies have been pressed down horizontally? All these problems I cannot as yet answer satisfactorily, much less explain with any degree of certainty.

14. Very coarse, heavy, and hard lava, full of bladders, almost black, intermixed with white grains resembling quartz, which in some places have a figure not very unlike a square.

The black matter is not attracted by the magnet; but if a piece of it is

held against a compass, the needle visibly moves. When tried in the crucible, it yields from ten to twelve pounds of iron in every 100 weight: it does not dissolve in the least with sal soda, with great difficulty with borax, and hardly visible by fusible urinous salt. It seems to contain a great deal of clay earth in its composition, which may be extracted by all solvents of acids.

It is well known that this earth, when it is entirely free from any other mixture, may by means of heat and drying be brought to that degree of hardness, as to give fire with a steel, which proceeds from the parts being brought closer together, and contracted in a space only half as large. By being thus contracted, it obtains a solidity and hardness; and besides, the surface is so much diminished, in proportion to the whole mass, that the water cannot penetrate any farther to soften it.

We have almost daily opportunities in the study of chemistry of convinc-
ing

ing ourselves, that a substance with a small surface cannot be changed in any manner by liquid solvents ; but may however be attacked by them, in proportion to the different degrees of pulverization ; nay, even a substance which cannot be reduced by the finest mechanical division, may frequently be separated, as much as is necessary, by a chemical one ; that is to say, by a preceding solution in another solvent. The attraction is here in proportion to the extent of the surface ; and the larger this is, the stronger will be the attack : consequently I cannot believe that any clay, petrified by heat or slow drying, can have undergone any essential change, but only that its parts have so contracted themselves as to give it the hardness of a flint to prevent it from imbibing any visible quantity of water. But as soon as it has been dissolved by any acid whatever, and its parts have by this means been brought out of its former contraction, to the requisite degree of fineness and expansion, it becomes as soft as before, without the

acid contributing any more to it than has been said, as all kinds of acids succeed equally well.

I have a very good assortment of the lava of Solfatera, by which it is very evident that the sulphureous acid, which had penetrated the black lava, deprived it gradually, partly of its combustible quality, and had also whitened it (to effect which other substances, particularly silk, are likewise exposed to sulphureous exhalations) and partly had reduced it by solution, either to a perfect allum, or at least to the common nature of any loose clay. I have likewise produced all these effects with aqua-fortis, or any other acid, in a lava which had not yet suffered any change.

The white, which possesses more or less of those transparent grains or rays with which the lava is chequered, do not seem to be of the nature of quartz, as they cannot be attacked by sal soda; they are however, with some difficulty, dissolved by borax and fusible urinous salt.

These

These effects are perfectly similar to those produced upon the diamond, ruby, saphire, topaz, and hyacinth. The chrysolite, garnet, turmaline, and shirl, can neither be dissolved by sal sodæ, though they are somewhat attacked by it, when reduced to a fine powder; and upon the two last mentioned ones it produces a slight effervescence. On this account it is possible that the precious stones of mount Vesuvius, which are sold at Naples, are nearer related to the real precious stones than is generally imagined.

15. A finer kind of lava, quite porous within, and entirely burnt out, and considerably lighter on that account than the preceding ones. I have not found any such grains in it resembling quartz.

16. The so called Icelandic agate. This is of a black or blackish-brown colour, and a little transparent at the thin edges like glass, and gives fire with the steel.

It cannot easily be melted by itself, but becomes white, and flies in pieces. It can hardly be dissolved in
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the fire by fusible urinous salt ; but it succeeds a little better with borax, though with some difficulty : with sal sodæ it dissolves very little, though in the first moments some ebullition is perceived, and the whole mass is afterwards reduced to powder.

From hence it may be concluded, that the Icelandic agate has been produced by an excessive fire out of the lava described in N^o 14. I have found no crystals of this glass in the collection. If any person has such in their possession, they should be examined to see if they are exactly of the same nature and substance with the above described agate, and if their form has not been produced accidentally by bursting asunder.

17. More or less light, spongy, and burnt-out pumice-stone, particularly black and reddish-brown. Quarz crystals are sometimes found in them ; but oftener the rays and grains resembling quarz.

18. Stones thrown out of the volcano, grey or burnt brown, which seem to consist of a hardened clay mixed with

with filiceous earth. They are sprinkled with rays and grains resembling quarz, and some few flakes of mica. They fuse with great difficulty in the fire; with sal sodæ they shew some effervescence at first, but however it soon ceases: the parts resembling quarz do not produce any motion at all. From this we may conclude, that the lava mentioned in N^o 14, principally originates from this mass.

The other loose stones which I have received from you, Sir, to all appearance have no absolute connection with the eruptions of fire, though some have been suspected of it. I will enumerate them here separately:

19. Red and green jasper, which, in some places where it is broken, is quite smooth and shining; this circumstance distinguishes it from the common jasper, which is dull and clay-like where it is broken. It has besides all the qualities of true jasper; strikes fire with the steel, does not melt in the most violent fire, but is dissolved by sal sodæ with an effervescence, &c. &c. As to the smooth-

smoothness of some parts, it cannot proceed from a commencing fusion, as it becomes black and dark in a weaker fire. We here only find a new link in the connected chain of nature, by which the jasper is united with the flint.

There is no black jasper in your collection ; but the pieces, which to appearance come nearest to it, belong to the class of the trapp, and shall be described hereafter.

20. Grey, greenish slate, resembling jasper, that gives sparks with the steel, is attacked with a quick effervescence by *sal sodæ*, but not farther dissolved by it. In some places are grains resembling quartz, which are easily dissolved in fusible urinous salt, but do not shew the least effervescence in *sal sodæ*.

21. The small crystals, said to resemble cocks-combs ; they are nothing but a different appearance or change of the heavy spar.

22. A chalcedon crust with smooth prominencies, like what they call hæmatites : this is dissolved with the utmost

most difficulty by fusible urinous salt, with more ease by borax, and with a violent effervescence by sal sodæ, exactly as the flint.

23. Zeolite; two kinds: the one is solid, white, and internally, as it were, composed of globose parts, in which rays proceeding from the center appear that resemble fine threads.

This sort swells a little by the blow-pipe, dissolves perfectly with borax, separates in sal sodæ with some effervescence, but soon ceases, and leaves some part undissolved.

The other sort consists of a plate, which in colour and break resembles a carnelian: it has a quantity of small prominencies in it, filled with irregular white crystals, and some of the cavities are filled with a loose-grained and brownish-red substance.

The substance resembling a carnelian becomes white in the fire, bubbles up, and becomes fusible.

The crystalline substance becomes more frothy in the fire than the carnelian, and has all the qualities of the zeolite.

The

The sandy substance hardly swells; is dissolved with difficulty by borax, and is attacked at first with a sudden effervescence by sal sodæ.

As it is not uncommon even in the professors of morality to pass from one wrong step to another, so are we not without examples of this kind in those who make nature their study. Ten years ago it was a general opinion that the surface of the earth, together with the mountains upon it, had been produced by moisture. It is true, some declared the fire to be the first original cause, but the greater number paid little attention to this opinion. Now, on the contrary, that a subterraneous fire had been the principal agent gains ground daily: every thing is supposed to have been melted even to the granite. My own sentiments with regard to it is this, that both the fire and water have contributed their share in this operation, though in such a proportion, that the force of the former extends much further than the latter; and, on

the contrary, that the fire has only worked in some parts of the surface of the earth.

It is not an easy matter to explain how the granite, which consists of clear quartz-crystals, solid field-spar, and limmer (*mica*) with flat scales, has been able to support a fusion, without the quartz bursting, or becoming opaque.

This is yet less to be conceived of the field-spar, that becomes soft and liquid in a weak fire, and has a dull appearance. The glimmer splits its scales asunder in the fire, and frequently twists them together again in a very different manner from that in which they appear in the granite. Notwithstanding all this, if the granite is considered as a production of the fire, it need not be wondered at, that the zeolite has likewise been comprehended in this supposition.

I will allow that crystals may be produced by the dry method, and I know several ways of obtaining them, both by fusion and sublimation; but I can never be persuaded that the zeolite
has

has been produced by the assistance of fire. It is true, that sometimes they are found in loose stones, and in such places where volcanos had formerly raged: it is likewise found in solid rocks that have never been exposed to these fires, as at Gustavenberg in Jemtland.

If more sorts than one are also certainly free from all suspicion of having been subject to fusion, how is it possible, without the clearest proofs, to suppose that the whole genus has been subject to it? If the Icelandic zeolite has been prepared by fire, we may justly question how it can produce above five quarts in twenty-five of water in distilling. This may likewise be applied to all the other sorts, tho' they generally contain less water, and the red sort from Adelfors only one quart in twenty-five. This is evidently the water of crystallization, in proportion to which each kind swells more or less by the blow-pipe. The Icelandic and Feroe zeolites are most subject to this, almost like borax; the Adelfors zeolite swells much less, and that
from

from Upland, and several other sorts, so little, that it ceases in a moment; and even then produces so small an expansion of space, that it is scarcely perceivable to the eye.

Since therefore all zeolites contain this water of crystallization, which is neither found nor expected in the productions of fire, it seems to me to be undeniable, that they have been produced in the way of moisture; besides, the zeolites do not consist of a simple particular kind of earth, but of three different sorts which are mixed together, and in a manner the one dissolved by the other, in consequence of which their connection cannot be considered as an original earth. In all, the greatest part consists of siliceous earth, the next is argillaceous earth, and the least part is calcareous earth. The two last sorts may be dissolved by acids, and then precipitated by alkali volatile causticum, by which the argillaceous earth, but not the calcareous earth, after being separated from the first by filtrating, may be precipitated by sal sodæ.

In this manner I have found that the zeolites described above, contain 48 in 100 of siliceous earth, 22 of pure argillaceous earth, and from 12 to 14 of calcareous earth. If these numbers are added together, and reckoned with what it contains of water, the produce is something more than 100. This surplus proceeds from the calcareous earth, that enters into the zeolite without fixed air, with which it is afterwards impregnated during the precipitation. Other

zeolites contain exactly the same substances, only in different proportions.

Of those which I have hitherto examined, the Jemtland zeolite contains the greatest quantity of calcareous earth, that is to say, 16 parts in 100, and that from Ferøe the least, namely, 8 in 100. The red zeolite from Adelfors contains the greatest quantity of siliceous earth, to wit 80 in 100, and the Icelandic the least, to wit, 48 in 100. The zeolite from Ferøe contains most argillaceous earth, namely, about 25 in 100, and that from Adelfors the least, or about 9 in 100. When the original compo-

sition

sition of any kind of stone is thus known, it is not difficult to determine its qualities.

The zeolites at first froth and swell in the fire, the cause of which has been already explained.

They afterward fuse more or less perfectly. The swapparara may be reduced to a clear glass, and the Upland red zeolite can hardly be brought to give any signs of vitrification on the surface.

It is well known that quartz, pure argillaceous earth and lime, cannot separately be made to fuse, nor two and two mixed together in many cases; but when all three are compounded, they are more or less inclined to fusion. One part of pure argillaceous earth, with one part of lime, and two and a half to three parts of quartz, afford a mixture, which is easiest brought to fuse. If the composition of the zeolites is compared with this mixture, they are found to be fusible in the same measure as the proportion of their constituent parts approaches more or less to the above-mentioned composition.

They are more strongly attacked by sal sodæ than by borax, or fusible urinous salt, because there is in all most siliceous earth, which is best dissolved by the solid alkaline salt in the dry way.

Lastly, several sorts have the quality of yielding jellies, that is to say, they change a proportionable quantity of acid to a semi-transparent congealed mass, which resembles a jelly.

These congelations may in general be produced in different ways; sometime the menstruum by length of time loses its power, when the dissolved part is attacked gradually, though imperfectly dissolved, so that in a manner it remains suspended half dissolved, and after some evaporation at last congeals to a tough coherent substance. This frequently happened in dissolving tin in marine acid, or aqua regia, when the inflammable substance decreases too much, and by that means weakens the connection between the metal and the solvent.

Sometimes a kind of gelatinous congelation is produced by an imperfect precipitation. For instance, when

when the liquor filicum is united with a certain quantity of acid, so that the siliceous earth is not entirely separated, but remains suspended in the liquor. This much resembles a circumstance exhibited by some zeolites, which I will now more fully explain.

As the red zeolite of Adelfors produces this effect more clearly than any other, it shall serve as an instance of it. After this is separated and freed as much as possible from calcareous spar, three or four tea spoons full of it must be thrown into a wine glass half filled with common aqua-fortis; when after a short time the whole solution will be found in the form of a reddish gelatinous substance, that nothing of it runs out if even the glass is turned. To discover the cause of this, I have taken some of the clearest jelly, and dissolved it with boiling water in a glass mortar, and left it to dry on a filtering paper after a perfect filtration, by which means the place which it occupied was incredibly diminished. I then tried this substance with acids, but it was not at all at-

tacked, and did not melt in the strongest fire alone. The fusible urinous salt hardly attacked it; borax dissolved it, though with difficulty; but sal sodæ dissolved it perfectly with a strong effervescence. In consequence of this the gelatinous substance chiefly consists of siliceous earth expanded in the highest degree. But by what means has this indissoluble substance been introduced into a solvent?

We have before observed, that the Adelfors zeolite contains eighty parts in a hundred of siliceous earth, nine and a half of argillaceous earth, and six and a half of calcareous earth free from fixed air; all which substances are united as close as possible. If therefore the powder is thrown into an acid, and remains there during some time, the argillaceous and calcareous earth are immediately attacked by it; but these are internally connected with the siliceous earth, and consequently take a considerable part of it half dissolved into the spongy and swollen state, which all substances generally exhibit in the moment of precipita-

precipitation. The same thing happens when a resinous gum is laid into spirits of wine; part of the gum, together with the resin, is then immediately dissolved by the spirit of wine on account of its connection, though the first alone cannot be dissolved by it at all. If a sufficient quantity of water or acid is added before the liquor begins to congeal, no congelation ensues, but the siliceous earth falls in loose flakes to the bottom, which evidently proves that the solvent, in regard to its quantity and strength, must be confined within certain limits. An addition of some chalk increases its tendency to gelatinous congelations, partly because the solution becomes more broken and solid, and partly by means of bubbles of fixed air, which attach themselves to the spongy siliceous powder, and make it lighter; whence the zeolite of Adelfors in this case seems to have an advantage over every other sort, on account of the lime-spar naturally mixed with it; the principal part however no doubt depends on the

several parts which compose it. Some sorts afford only a gelatinous substance after a preparatory calcination; the cause of which most probably is this, that the calcareous earth has not before been enough united with the siliceous earth, at least not with the whole of it. It is well known that lime and quartz, when exposed to the operation of a fire, that has only caused them to bake together, nevertheless afterwards yield a gelatinous substance. Alcaline salt mixed with sand affords a similar demi-concretion, as when we calcine potashes; on which account the clearest solution a long while after precipitates siliceous powder, in the same proportion that the alkaline salt attracts fixed air, with which it preferably unites itself. This generally produces a gelatinous congelation, when the water is saturated with alkaline salt, and also is well charged with siliceous earth.

From the same cause, clay, spathose fluor, and other substances, hard to be dissolved in acids, may be brought to a gelatinous congelation, when they have

have before by fusion been united with alkaline salt, borax, or calcareous earth: calcareous earth by itself never gives a gelatinous substance in acids, consequently it can so much the less become a siliceous earth by this method, as has however been thought by some, who would soon relinquish their opinion if they would only make experiments themselves; where there is no flint before, it cannot possibly be produced by any other acid, but that which is obtained from spathose fluor.

But at present this is enough of the zeolite, of which I have treated more extensively, as it is found in great abundance in Iceland, and is supposed by some to be produced in the dry way; but I hope that this matter is at present entirely determined, not only by its separation, but also by its production, which happens daily in the water. See N° II.

I have for several years past endeavoured to discover the number as well as the nature of the original kinds of earth. In the year 1758 Mr. Cronstedt counted nine; if he had lived longer

longer for the benefit of the sciences, he would no doubt have rectified this account. In consequence of my experiments I have discovered the following six sorts :

1. Calcareous earth, which after being saturated by acid of vitriol affords a kind of gypsum.

2. Terra ponderosa, which with acid of vitriol gives a ponderous spar, and in several respects is very different from the calcareous earth.

3. Magnesia, which, together with acid of vitriol, produces the English or Epsom salt.

These three kinds are generally found saturated with fixed air, and they are on that account subject to an effervescence with stronger acids.

4. Argillaceous earth, which, together with the vitriolic acid, produces allum.

The common argillaceous earth is always mixed with siliceous earth, but the sort here meant must be entirely pure.

5. Siliceous earth, which is not attacked by any acid yet known, the fluor

fluor acid excepted. In the dry way it can be dissolved with a third part of its weight of fixed alkali to a transparent lasting glass, which at first is affected with a strong effervescence.

6. Gemmeous earth, that is not attacked by any known acid, and clearly distinguishes itself from the preceding sorts, by its being entirely indissoluble, and being subject to a weaker effervescence in the fire with fixed alkali. It is found in all the gems or precious stones.

I have in vain made use of various methods to separate these earths into more simple principles, and to all appearance others would have no better success than I have had: if they are really compounds, they are at least simple in regard to the method known among us of separating substances, and do not arise from one another. Whatever has therefore been objected to this opinion from prejudice, cannot subsist after experiments have been made upon that subject. We must not pretend to improve nature according to our notions,
but

but endeavour to distinguish all kinds of substances, which have sufficient and lasting marks of distinctions. No certain origin can be made unless the separation and composition of them, which may be relied on, has been made before. All the different sorts of stone and earth, hitherto known, are composed of one or more of the six principles sorts before-mentioned, which shall be proved more at large in another place, as soon as I am able to make some experiments that require repetition.

Of the Basalts.

OF all the mountains hitherto known, there are without doubt not any more remarkable than those that are composed of angular pillars. A few years ago only one or two of this kind were known; but new ones are daily discovered, which is a plain proof how much our attention requires being roused to prevent

prevent it from slumbering, even on the most important occasions.

It cannot much be doubted that there has been some connections between these pillars, and the effects of a subterraneous fire, as they are found in places where the signs of fire are yet visible; and as they are even found mixed with lava, tophus, and other substances produced by fire.

The cause of the regular form of these pillars is a problem which we have hitherto been unable to solve satisfactorily. This difficulty has appeared so insurmountable to some, that they have thought it impossible to be the effects of Nature, and have considered them as works made by human hands: this idea betrays the utmost ignorance in regard to the true nature of these mountains of pillars, and does not even deserve a refutation.

As far as we know, Nature makes use of three methods to produce regular forms in the mineral kingdom, namely, that of crystallization or precipitation: 2dly, the crusting or settling of the external surface of a liquid

liquid mass whilst it is cooling : and
3dly, the bursting of a moist substance
whilst it is drying.

The first method is the most common, but to all appearance Nature has not made use of this in the present case. Crystals are seldom or never found in any considerable quantity running in the same direction, but either inclining from one another, or, what is still more common, placed towards one another in several sloping directions. They are also generally separated a little from one another, when they are regular ; the nature of the thing likewise requires this, because the several particles, of which the crystals are composed, must have the liberty of following that power which affects their regular disposition.

The basalt columns, on the contrary, whose height are frequently from thirty to forty feet, are placed parallel to one another in considerable numbers, and so close together that the point of a knife can hardly be introduced between them. Besides, in most places, each pillar is divided into several parts

parts or joints, which seem to be placed upon one another; and indeed it is not uncommon for crystals to be formed above one another in different layers, when the solvent has been visibly diminished at different times; but then the upper crystals never fit so exactly upon the lower ones as to produce connected prisms of the same length and depth as all the strata taken together, but each stratum separately forms its own crystals.

How then can the Giant's Causeway in the county of Antrim, Fingal's Cave at Staffa, and all other assemblages of pillars of the same kind, be considered as crystallizations? Precipitation, both in the wet and dry manner, requires that the particles should be free enough to fix themselves in a certain order; and as this is not practicable in a large melted mass, no crystallizations appear in it, except on its surface, or in its cavities.

Add to this, that the basalts in a fresh fracture, do not shew a plain smooth surface under the microscope, but appear sometimes like grains of different magnitude, and at other times

times resemble fine rays running in different directions, which does not correspond with the internal structure of the crystals, which I have endeavoured to examine in another place.

From what I have hitherto mentioned, the opinion that the basalts have been produced by crystallization, becomes at least less probable, whether we admit the wet or dry method. But I must not omit that the spars exhibit a kind of crystallization, which at first sight resembles a heap of basalts, but upon a closer examination a very great difference is observed. The form of the spar is every where alike, but the basalts differ from one another in point of size and number of sides; the former when broken consists of many small unequal cubes, but the basalt does not separate in regular parts, &c. &c.

Nature's second method to produce regular forms is that of crushing the outer surface of a melted mass. By a sudden refrigeration Nature, to effect this purpose, makes use of polyedrous and irregular forms.

forms. If we suppose a considerable bed, which is become fluid by fire, and spread over a plain, it evidently appears that the surface must first of all lose the degree of heat requisite for melting, and begin to congeal; but the cold requisite for this purpose likewise contracts the uppermost congealed stratum into a narrower space, and consequently causes it to separate from the remaining liquid mass, as the side exposed to the air is already too stiff to give way. In this manner a stratum is produced running in a parallel direction with the whole mass, others still are produced by the same cause, in proportion as the refrigeration penetrates deeper.

Hence we may, in my opinion, very plainly see how a bed may be divided into strata. In the same manner the refrigeration advances on the sides, which consequently divides the strata into polyedrous pieces of pillars, which can hardly ever be exactly square, as the strongest refrigeration into the inner parts of the mass advances almost in a diagonal line from the cor-

ners. If we add to this, that a large mass cannot be equal throughout its composition, nor every where liquid in the same degree, it will be easy to discover the cause of several irregularities. If the depth of the bed is very considerable, in proportion to its breadth, prismatic pillars, without cross-divisions, are produced, at least lengthways from the uppermost surface downwards.

The third way is perfectly similar to the preceding in respect to the effect, but is different from it by the mass being soaked with water, and by the bursting of it asunder, being the effect of the contraction whilst it is drying. If we suppose such a bed to be spread over a level space, the drying advances in the same manner as the refrigeration in the former case.

This separation into strata properly happens when a considerable quantity of clay enters into the whole composition, because the clay decreases more than any other kind of earth in drying.

We

We must now examine which of these two ways may best serve to explain the manner in which the basalts are produced, for it is hardly possible that they should have been formed by crystallization.

However well founded the opinion may appear of deducing them from a melted substance, several very considerable objections however may be raised against it, which I shall not forget to mention. It seems therefore more credible to me, that they have been produced out of their substance whilst it was yet soft, or at least not too hard to be softened by exhalations. If we therefore suppose that a bed is spread over a place where a volcano begins to work, it is evident that a great quantity of the water, always present on these occasions, is driven upwards in exhalations or vapours; these it is well known possess a penetrating softening power, by means of which they also produce their first effect; but when they are increased to a sufficient quantity, they force this tough moist substance

upwards, which then gradually falls, and during this time bursts in the manner described above.

My reasons for this opinion are these; first, we do not find the internal grain of the basalts melted or vitrified, which however soon happens by fusion, and for which purpose only a very small degree of fire is requisite. It consequently is very hard to explain how this substance could have been so fluid, that no traces of bubbles appear in it (at least I have not been able to discover any after the nicest examination into the Scotch and Icelandic basalts) and yet when broken appear dull and uneven. I know very well that lava is seldom vitrified within; but the great number of bubbles and pores which are found in the whole mass, are more than sufficient proofs that it has not been perfectly melted to its smallest parts, but has only been brought to be near fluid.

Secondly, the basalts so much resemble the finer trapp, both in respect to their grain and original composition,

sition, that they can hardly be distinguished in small fragments, as will be more plainly proved in the comparison which I will make hereafter. See N^o 24.

But the trapp in all probability has never been melted, at least not in those parts where I have had opportunities of examining it.

Almost in all the West Gothic stratified mountains, the uppermost stratum is trapp; and it must be well observed that it always lies upon black allum slate. Is it therefore credible that this substance, which in many places extend above a hundred yards, can have been perfectly melted, without causing the slate lying beneath it to lose some part of its blackness, even in those places where they touch one another, as this effect may be produced in a small culinary fire?

There is besides a finer kind of trapp, which is generally found in veins or loads, and frequently in very antient mountains, where not the least traces of subterraneous fire are to be seen.

The basalt mountains seem to be very ancient, at least I do not know that the age of any one is ascertained. Should they then be so old, that the substance of the trapp was not yet perfectly hardened, when were they produced? Besides, we frequently find to this day clayey substances at a great depth, which are so soft that they may be scraped by the nail, but afterwards become very hard when exposed to the air.

There have without doubt been many eruptions of fire on the isle of Staffa, as the situation of the pillars and their being removed out of their places evidently prove.

You, Sir, have likewise brought a very clear proof of this from thence, which is a piece of basalt, that on the exteriorly is full of hollows, and in a manner burnt.

A hard substance, when exposed to a degree of heat insufficient to melt the whole piece, may however be attacked by it in some parts of the surface most liable to become fluid.

The

The mixture of a large mass is seldom every where so uniform, that some parts should not be more liable to melt than others.

Crooked pillars may be produced as well by the drying as the refrigeration of a liquid mass ; for this purpose it is only necessary that the surface should be bent, as the stratum always runs in a parallel direction with it.

From what I have hitherto said you will perceive it is my opinion, that the basalts have been produced by the assistance of a subterraneous fire, but that it is not yet determined whether they have been rent asunder after the fusion, or by drying: this last however appears more credible to me on account of the reasons I have mentioned. For to speak strictly, the substances inclosed in the basalts, though they should even be volcanic, do not yet with certainty prove a preceding fusion, as a substance softened by water may be as proper for it as one fused by fire. I am however very far from being inclined to

maintain my opinion any farther than it agrees with certain experiments and experience.

Truth will sooner or later be discovered; and I know nothing more derogatory to the honour of a natural historian, than having wilfully obstructed its passage.

I will now give a more full description of the basalts and different kinds of trapp which you have brought from Staffa and Iceland.

24. Basalt from Staffa.—The piece presented to me is a prismatic hexagonal fragment, three sides of which are almost of equal dimensions, and are connected with one another; two others are larger, and are separated from one another by the sixth and smallest; it is a little concave at the top, and convex at the bottom.

Trapp is generally found in square irregular cubes, whence it has most probably obtained its denomination, on account of some similarity with stones made use of for stair-cases.

It is also found in prismatic triangular forms, though rarely, as also in the form of immense pillars. Of this kind are those called Traelestenar, opposite Bragnum, at the foot of the Hanneberg, which have separated themselves from the remaining part of the bed; and in 1759, when I first saw them, formed an angle of about eight degrees with the plumb-line.

The basalt from Staffa, when newly broken, is of a blackish grey, shining, and small-scaled; and I have discovered with the microscope some small white particles sprinkled up and down.

The finest trapp is perfectly similar when broken, only of a lighter colour, which proceeds from the greater quantity of white particles.

The surface decays to a grey-yellow loose crust, which loses itself in the more solid mass.

The fine trapp decays in the same manner.

The basalt when struck with the steel hardly gives fire, though a spark
may

may now and then be obtained with difficulty.

This same circumstance may be observed of the trapp.

Its specific weight is about 3000, and that of the trapp about 2990.

It becomes very beautiful by cutting, polishing, and grinding.

Likewise the more fine kind of trapp.

It yields an ash-coloured powder.

The trapp yields rather a powder of a more light colour.

It soon melts to black glassy flags.

The trapp likewise.

The basalt is attacked by sal sodæ with an effervescence which soon ceases, and though some separation ensues, the greater part however remains undissolved. Borax perfectly solves it without effervescence, and gives a clear iron-coloured glass. It is solved with great difficulty by fusible urinous salt, and whilst cooling becomes of a whitish grey, and not transparent.

The same effects are produced by these acids upon the trapp.

One hundred parts of basalt very finely powdered, and several times digested with fresh aqua regia, and then well washed and dried, leave sixty-eight parts undissolved.

The remainder of this shews a little effervescence before it unites with the sal sodæ, and dissolves very little. It is dissolved with ease by borax, and with difficulty by fusible urinous salt. It seems therefore to be a mixture of siliceous and gemmeous earth.

The solution gives by precipitation with lixivium sanguinis as much Prussian blue as is equal to twenty-six parts in 100 of iron; though the basalt, by being tried in the usual manner in the crucible, does not yield above ten in 100. This proves that lixivium sanguinis affords the most exact method of assaying iron ore.

When at last the solution is precipitated with caustic volatile alkali, after the iron has been separated by lixivium sanguinis, saturated with acid, pure argillaceous earth is obtained.

Some-

Sometimes a little calcareous earth appears after a preceding precipitation; when dissolved fal sodæ is added; but sometimes not the smallest traces of it can be discovered, even with the acid of sugar, which is however the safest method hitherto known of discovering it. The calcareous earth seems therefore to be accidental. This is however very certain, that the interstices between the pillars are sometimes found filled up with calcareous spar.

The trapp is exactly of the same nature, and contains nearly the same alloy, so that the experiments differ only one or a half part in one hundred. The most considerable difference consists in the calcareous earth appearing here more visibly, so that generally a slight effervescence is observed when an acid is poured on the powder.

25. Basalt from Hvitara, near Skalholt, in Iceland.—The piece in my possession is too small to discover its form; only a part of the outside can be distinguished. When fresh broken it

it resembles the basalt from Staffa, though something may be observed in it which is very seldom discovered in the last. These are small round cavities, not larger than pins heads, thinly scattered in some places, as likewise on the outside. All these cavities are filled up with a white, green, or brown powder.

May not these perhaps have been some particles of a substance, which easily dissolving was become liquid, though the whole mass had not a sufficient degree of heat to melt it?

But whence can these cavities be filled with this powder? In the midst of so solid a mass, no decay seems to be possible.

The substance of the basalt itself produces a little effervescence with sal sodæ, and separates without being visibly dissolved. It dissolves in borax, as likewise in fusible urinous salt, although with more difficulty. By the common method of proving it in the crucible it yields ten parts in one hundred of iron. The same circumstances may
be

be observed in trying the powder that fills up the cavities; it only seems to melt a little easier than the solid substance surrounding it.

26. The basalt from Langarnas perfectly resembles coarse trapp, though it has more white particles, and sometimes crystallizations as large as a cherry-stone; the dark-grey and white parts prove to be entirely of the same nature by the blow-pipe, becomes fluid by itself, and produces a sudden effervescence with *sal sodæ*, but without being quite dissolved by it: it is exactly as the preceding sort.

27. Black, solid glossy trapp, knotty within, and resembling wood in its internal structure, being full of filaments. Many pieces are grown to a crust of pumice on one side or another, though their edges are quite fresh and smooth; whence we may conclude, that they themselves have not been melted, but have either been thrown into the lava, which was already burnt out, or that the lava has flowed over them: some part of it however

seems to have been more attacked by the fire.

The manner in which the fire and acids operate upon this trapp, is exactly the same as with the preceding basalt. There are likewise some grains scattered in it resembling quartz, which are not solv'd by sal sodæ, nor does it cause any effervescence; borax and fusible urinous salt entirely dissolves them, though slowly.

28. A compact dark-brown trapp from Vido, the surface of which is glassy and uneven, as if it had been made fluid by fire. It must also be observed, that crystallizations of fresh pyrites are frequently found in these glassy rough pieces. The glassy substance easily becomes fluid with some ebullition, almost like shirl; besides, it exhibits the same circumstances with acids as the preceding.

You will see, Sir, by this long letter, that in the eruptions in Iceland argillaceous and siliceous substances have been principally concerned, as has been the case in other parts, I know very well that Mr. Beaumè
main-

maintains, that filex might be made to afford allum with acid of vitriol after it has been dissolved in liquor filicum with sal fodæ. But when the fusions are made in vessels which contain no argillaceous earth, no allum can be obtained with acid of vitriol, which however may be obtained when the vegetable alkali is kept fluid during a considerable time in a common crucible, because the alkali dissolves some part of the vessel itself. Pure siliceous earth is intirely indissoluble by itself in acid of vitriol, let it be treated in any manner whatsoever.

Let this account of these dreadful devastations be sufficient.

Homo naturæ minister et interpres, tantum facit et intelligit, quantum de naturæ ordine, re vel mente observaverit, nec amplius scit aut potest. *Baco.*

F I N I S.

