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FROSTIANA:
OR
A HISTORY OF
THE RIVER THAMES,
In a Frozen State;
WITH AN ACCOUNT OF
THE LATE SEVERE FROST;
AND THE WONDERFUL EFFECTS
OF
Frost, Snow, Ice, and Cold,
IN ENGLAND,
AND IN DIFFERENT PARTS OF THE WORLD;
INTERSPERSED
WITH VARIOUS AMUSING ANECDOTES.

TO WHICH IS ADDED,
THE ART OF SKATING.

Printed book
A dreadful winter came; each day severe,
Misty when mild, and icy-cold when clear.

CRABBE.

153
London:

Printed and published on the ICE on the River Thames,
February 5, 1814, by G. DAVIS.

Sold also by Sherwood, Neely, and Jones, Paternoster Row.

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National Oceanic and Atmospheric Administration

Rare Books from 1600-1800

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Large impression of the
the page of this book was
into a cup in the ice on
the Thames. (see "Advertisement")



OK
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W. Wright

July 15th/86

X Sept 26/86

Advertisement.

O Winter! ruler of th' inverted year,
Thy scattered hair, with sleet-like ashes filled,
Thy breath congealed upon thy lips, thy cheeks
Fringed with a beard made white with other snows
Than those of age; thy forehead wrapped in clouds,
A leafless branch thy sceptre, and thy throne
A sliding car, indebted to no wheels
But urged by storms along its slipp'ry way;
I love thee, all unlovely as thou seem'st,
And dreaded as thou art.

COWPER.

TO the reflecting mind, nothing can be more agreeable than a philosophical account of the marvellous productions of NATURE.—This enables us to look through Nature up to NATURE'S GOD, and forms one of the most pleasing tasks:—whether the beauties of Spring, the lavish gifts of Summer; the rich fruits of Autumn; or the sterile grandeur of WINTER, be the object of our contemplation.

The attentive observer, as he walks forth to explore the dreary scenes around him, will find abundance of pleasure and instruction in the investigation of the various phenomena peculiar to this inclement season. The rigours of the present Winter indeed, are almost without a parallel in the annals of English Meteorology, and they accordingly, have excited more than ordinary notice.

To gratify, as well as to stimulate inquiry, we have not only given a philosophical explanation of Frost, Snow, Ice, and Cold, but have enlivened our descriptions by various anecdotes of their wonderful effects in England, and in different parts of the world.

An Introduction is prefixed, containing a full account of the late severe frost; and, in another part of the work, will be found an amusing narrative of the events which took place on the frozen surface of the THAMES, from the 30th of January to the 5th of February inclusive.

As an additional object of curiosity, it may be proper to mention, that a large impression of the Title page of this work, was actually printed on the ICE on the RIVER THAMES !!

SNOW-HILL,
February 5th, 1814.

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INTRODUCTION;

Containing an Account of

The late Frost.

THE late severe frost was ushered in by a *fog*, which for its density and duration has seldom been equalled. The winter of 1795 was marked by much the same circumstances as the present; the nights were so extremely foggy, that torches were used in the streets; coals were 4s. a bushel; and vegetables extremely dear. But, the only fog, at all comparable to that of 1813, was one which happened on the evening of new year's day, 1730, when many lives were lost in London in consequence. The fog was so dense that several persons fell into Fleet-ditch, and others into the Canal in St. James's Park, by mistaking their way; much damage was also done on the Thames.

The great fog which preceded the late frost, commenced, in London, on the evening of the 27th of December, 1813, about two hours before Lord Castlereagh set out from London on his way to embark for the continent. Happily his lordship proceeded on his journey, without interruption;—it was not so with the PRINCE REGENT, who, intending to pay a visit to the Marquis of Salisbury at Hatfield House, was obliged to return back to Carlton House, after one of his outriders had fallen

into a ditch on this side of Kentish Town, and which short excursion occupied several hours. Mr. Croker, of the Admiralty, also wishing to proceed on a visit northward, wandered in the dark, for several hours, without making more than three or four miles progress.

This tremendous fog, or 'darkness that might be *felt!*' continued till the 3rd of January. On most of the roads, excepting the high north road, travelling was performed with the utmost danger, and the progress of the mails was greatly impeded. On Wednesday, the 29th, of December, the Birmingham mail was nearly *seven* hours in going from the Post-office to a mile or two below Uxbridge, a distance of 20 miles only: on this, and the other evenings, the short stages in the neighbourhood of London had two persons with links, running by the horses' heads; nevertheless, with this, and other precautions, some serious, and many whimsical accidents occurred. Pedestrians even carried links or lanterns, and many, who were not provided with these illuminators, lost themselves in the most frequented, and at other times well known streets. Hackney-coachmen mistook the pathway for the road, and *vice versa*,—the greatest confusion occurring.

On the 31st of December, the state of the metropolis, in consequence of the increased fog, was, at night, truly alarming. It required great attention and knowledge of the public streets to proceed any distance, and those persons who had any material business to transact were unavoidably compelled to carry torches. The usual lamps appeared through the haze no bigger than small candles. The more careful hackney-coachmen got off the box and led their horses, while others drove only at a walking pace. There were frequent meetings

of carriages, and great mischief ensued. Among the passengers much caution and apprehension prevailed. Many alarmed at the idea of being run down, made exclamations, such as "Who is coming?"—"Mind!"—"Take care!" &c. Females who had ventured abroad before the fog came on, were placed under great peril; several missed their way. Such was the extreme density of the atmosphere on Tuesday evening, the 28th, that the Maidenhead coach, on its return from town, missed the road near Harford Bridge, and was overturned. Lord Hawarden was among the passengers, and received an injury by the accident.

Almost immediately on the cessation of the fogs, heavy falls of snow took place. There is nothing in the memory of man to equal these falls. After several shorter intervals, the snow continued incessantly for 48 hours, and this too after the ground was covered with a condensation, the result of nearly four weeks continued frost. Almost the whole of the time the wind blew continually from the north and north-east, and was intensely cold. A short thaw also, which scarcely lasted one day, only rendered the state of the streets so much the worse. Hence the mass of snow and water became so thick, that it was with difficulty that hackney-coaches, with an additional horse, and other vehicles could plough their way through. Almost all kinds of trades and callings, carried on in the streets, stopped, which considerably increased the distresses of the lower orders. Few carriages, even stages, could travel on the roads, which, even about town seemed deserted. From many buildings, icicles, full a yard and a half long, were seen suspended. The house water-pipes were all frozen, whence it became necessary to have plugs in the streets for the supply of all ranks of

people. The Thames, from London Bridge to Blackfriars, was for nearly a fortnight completely blocked up at ebb tide.

All the ponds and rivers in the neighbourhood of London were completely frozen, and skating was pursued with great avidity on the Canal in St. James's, and the Serpentine in Hyde Park. On Monday, the 10th of January, the Canal and the Basin in the Green Park were conspicuous for the number of *steel-shod* heroes who covered their glassy surfaces, and who, according to their respective qualities, administered to the pleasure of the throng which crowded their banks; some by the agility and grace with which they performed their evolutions, and others by the tumbles and other accidents which marked their clumsy career. There was, as usual, a motley collection of all orders of his Majesty's subjects, engaged in the busy scene, who seemed all alike eager candidates for the applause of the multitude, and whether *sweep*, *dust-man*, *drummer*, or *beau*, each seemed conscious of possessing some claim, not only to his own good opinion, but to that of the *fair belles* who viewed his movements. There were several accidents in the course of the day, but none we believe of a serious nature.

While these Parks were thus numerously attended, Hyde Park had to boast of a more distinguished order of visitors, who, in the course of the afternoon, flocked in prodigious crowds to the banks of the Serpentine, which was covered with most excellent ice. Notwithstanding the keenness of the breeze, several females of dash, clad in robes of the richest fur, bid defiance to its chilling embrace, and, on the fragile bosom of the river ventured their fair frames. The skaters were in great numbers, and were of first-rate note. Some of the

most difficult movements of the art were executed with an agility and grace which excited universal admiration.

A lady and two officers performed a reel with a precision scarcely conceivable, and attracted a very numerous circle of spectators, whose boisterous applause so completely terrified the fair cause of their ecstasy, as to induce her to forego the pleasure she herself received from the amusement, and to put an end to that which she afforded to such as were disposed to admire her in silence.

Two unfortunate accidents, occurred; one *skating* lady dislocated the *patella* or kneecap, and five gentlemen and a lady were immersed in the icy fluid, but received no farther injury than a severe ducking.

On the 20th of January, in consequence of the great accumulation of snow heaped upon the ground, it became necessary to relieve the roofs of the houses by throwing off the load collected upon them; and by these means the carriage-ways in the middle of the streets were rendered scarcely passable for man or horse; and all the conveniencies described in pp. ix, x, were the consequence. The streams constantly flowing from the open plugs, added to the general mass of ice. An enormous increase took place in the price of coals, as the River navigation and other means of conveyance were entirely obstructed.

The continuation of the frost and snow induced many coach proprietors, particularly on the northern and western roads, not to continue running their coaches until a change of weather should take place. In many places where the road lies low, the snow had drifted higher than the coaches, which was the case as near town as Finchley Common. The snow had drifted into the road in the

course of one night, a depth of ~~of~~ sixteen feet, and it was impassable at first even to oxen. On Bagshot-heath there was a complete stoppage, and many accidents occurred by vehicles getting off the road. About Esher and Cobham again the road was completely choaked up.

With the exception of the Kent and Essex roads, no others were passable but a few miles out of London. The coaches on the western road remained stationary at different parts. The Windsor coach got through the snow at Colnbrook, which was sixteen feet deep, by employing about fifty labourers. Lower down, at Maidenhead-lane, the snow drifted to a great depth; and between Twyford and Reading it assumed quite a mountainous appearance. On parts of Bagshot-heath, it is impossible to convey an adequate idea of its situation. The Newcastle coach went off the road into a pit upwards of eight feet deep, but without doing mischief to either man or horse. The middle North-road was impassable as near as Highgate-hill.

On the 22d of January, and for some days afterwards, the ice on the Serpentine River exhibited a singular appearance, from the mountains of snow which the sweepers had collected together in different situations. The spaces allotted for the skaters were in the forms of circles, squares, and oblongs. Next to the carriage ride (on the north side) were many astonishing evolutions displayed. Skipping on skates, and the Turk-cap backwards, were among the most conspicuous. A sledge was drawn by a poney, *rough-shod*. The ice was not good, it being injured by the partial thaw in some places, and in others much *cut up*.—It was highly amusing to see the most elegantly dressed females *dashing* through the hillocks of snow.

Among the extraordinary aspects and appear-

ances of the late severe weather, the state of the river Thames was not the least singular. Vast quantities of pieces of floating ice, loaden generally with heaps of snow, were seen almost every where on the surface; and being carried up and down by the tide or the stream, and collected where the projecting banks or the bridges made a resistance to the flow, and a support to the accumulation, sometimes forming a chain of glaciers, united one moment,—at another clashing and cracking and dashing in a singular and awful manner: again, when the flood beneath was not sufficiently elevated to support the mass, and when the current passed strongly, the ice islands floated away, clashing and cracking as they went, rising one over another, and then receding, covered with angry foam, as the violence of the wind or wave impelled them.

In passing through the arches of the bridges, the crash was tremendous: for near the bridges, the floating pieces collected about mid-water, or while the current was less forcible, and ranged themselves regularly one line upon another, the stream forming them into order as it passed, where it made its way in force, till the increasing confinement of the channel added such violence to the conflict, that a disruption took place, and the broken ice, with a crash, burst away again, and was carried up or down with the tide or the stream. The river was entirely frozen over for the space of a week, and a complete FROST FAIR held upon it, a circumstantial account of which will be found in Chapter I. FROST, page 17 and following pages.

Never since the establishment of mail coaches did correspondence meet with such general interruption as on this occasion. Internal communication was completely at a stand till the roads could be in some degree cleared; for besides the drifts by

which they were rendered impassable, the whole face of the country presented one uniform sheet of snow, no trace of road being discoverable; and travellers had to make their path at the risk of being every moment overwhelmed. Waggon, carts, coaches, and vehicles of all descriptions, were left in the midst of the storm. The drivers finding they could proceed no farther, took the horses to the first convenient place, and there waited till a passage could be cut to enable them to proceed with safety.

Nothing could exceed the exertions of the Post-office in having the roads cleared in all directions for the conveyance of the mails, to and from the capital. The government also very properly interfered, and instructions were sent to every parish in the kingdom to employ labourers to clear the roads.

The snow accumulated in the midland counties, particularly on the borders of Northamptonshire and Warwickshire, to a height altogether unprecedented. In the neighbourhood of Dunchurch (a small village on the road to Birmingham, through Coventry), and for a few miles round that place, in all directions, the drifts exceeded the height of twenty-four feet, and no tracks of carriages or travellers could be discovered on the roads thereabouts, except on the great road, for many days.

The Cambridge mail-coach in coming to town, sunk into a hollow part of the road, and remained in that situation, with the snow drifting over it, from one o'clock to nine in the morning, when it was dragged out by fourteen waggon horses. Several passengers were in the coach the whole of the time; they were nearly frozen to death.

On Wednesday the 26th, the wind having veered round to the south-west, the effects of a thaw

were speedily discernible. The fall of the river at London-bridge for some days presented a scene both novel and interesting. At the ebbing of the tide, huge fragments of ice were precipitated down the stream with great violence, accompanied by a noise, equal to the report of a small piece of artillery. On the return of the tide, they were forced back again; but the obstacles opposed to their passage through the arches were so great, as apparently to threaten a total stoppage to the navigation of the river at this essential point, and which probably would have soon taken place had the frost continued with unabated severity.

On Thursday, Friday, and Saturday, the 27th, 28th, and 29th, the thaw continued, and the roads and streets were nearly impassable from floods, and the accumulation of snow. But on Sunday the 30th a sharp frost set in, and continued till the next Saturday evening, the 5th of February.

Accounts from the Country.

These narratives respecting the heavy falls of snow are truly astonishing; we select some of the most remarkable.

Falmouth. The weather has been more severe in this county, than has been remembered for twenty years. Heavy falls of snow, succeeded by hard frosts, have rendered all travelling by coach impracticable, and even on horseback highly dangerous. The mail coach, which started from this town for Exeter was overturned after having proceeded a few miles, but happily no material injury was sustained, by either passengers, driver, or guard. With much difficulty the coach was enabled, with the assistance of an additional pair of horses to reach the first stage; after which all endeavours to go farther were found

perfectly useless. The letters were, however, sent to Bodmin by the guard on horseback. The Fal-mouth and Plymouth coach has been prevented from travelling by the snow, and the passengers have been obliged to remain at St. Austell. We have no doubt that, farther to the eastward, the roads are in a still worse condition, as our last Plymouth letters mention, that the snow was then nearly four feet high in several of the streets in that town, and that all coaches for Exeter, &c. are unable to travel.

Liverpool, Jan. 17. We have now had three weeks of the most rigorous frost which has been remembered for a great number of years. Fahrenheit's thermometer stood at 15 degrees (17 below the freezing point,) at the Athenæum; in the country it was no doubt much lower. Such a quantity of ice has been accumulated in the Mersey, that boats could not pass over. Almost every kind of labour performed without doors is nearly at a stand.

Gloucester, Jan. 17. The severity of the frost, for the last fortnight, has not been exceeded by any that has preceded it. The Severn is frozen over, and the ice is "in many places" sufficiently strong to sustain persons on its surface: indeed, several people going to Tewkesbury market on Wednesday last, rode across the ice on horseback, at the Lode, near that place.

On Monday the cold was so intense, that the thermometer, exposed in a north-eastern aspect, stood at 13 degrees, which is 9 below the freezing point. On the eastern coast, it stood as low as 9 and 10; a degree of cold very unusual in this county.

Bristol, Jan. 18. The frost continues in this city with unusual severity. Our Floating Harbour now exhibits quite a novel scene: from

Cumberland Basin to the Feeder, at the bottom of Avon-street, it is one continued sheet of ice; and for the first time in the memory of man, the skater made his appearance under Bristol Bridge. The river Severn also is frozen over at various points, so as to bear the weight of passengers.

Whitehaven, Jan. 18. The frost which seemed likely to continue, has increased in severity, and is at this time more intense than ever. All the ponds, streams, &c. in this neighbourhood, are frozen; and there is scarcely a pump in this town that is not dry. The observations as to the thermometer are various; but all agree in ascertaining these instruments to be considerably lower than they have been for many years past.

The snow, which fell in great quantities on the night of Sunday the 9th, has been increased in a very considerable degree, by repeated heavy showers, and the whole rendered particularly severe by the high winds which prevailed during the earlier part of the storm, drifting the snow in many situations in such a manner, as to make travelling very tedious as well as dangerous, and in some places entirely blocking up the roads.

The effect has been to render the arrival of the post and carriers very uncertain. The former have for a week past been several hours later than the usual time. Our market, on Wednesday, was very thinly attended, it having been found (in many parts) impossible to travel until the snow was cut.

We understand the snow laid the deepest between Wigton and Cockermouth. A few miles to the south of this town there was little in comparison; but a great deal fell on Sunday last: and we hear that towards the evening it was nearly three feet deep on the road between Whitehaven and Egremont.

Dublin, Jan. 14. It is supposed that the present fall of snow has been as heavy as any ever known in Ireland. But as to the quantity, there seems to be no doubt of its being greater than ever before experienced in the same space of time. In this respect, we can answer that it is unparalleled for half a century, upon the authority of a very intelligent gentleman in this city, who has kept a regular diary of the weather for the last 50 years. The snow preceding Monday was so slight, as hardly to occasion even a remark, and yet, in the course of the day and night, it had descended so inconceivably thick and rapid, as to block up all the roads in such a manner as to preclude the possibility of the mail coaches being able to proceed. One indeed, and only one (from Galway) arrived the next morning. None has ventured to leave Dublin, and it was found impracticable to send the mails on horseback. Thus all intercourse with the interior has been cut off, and it was not until yesterday, when an intense frost suddenly commenced, that the communication was opened. About two o'clock, the inhabitants of this city witnessed the gratifying sight of several mail bags arriving from the country on horseback.

The depths of snow in the streets of Dublin almost exceeds credibility. In many of the narrow streets, after the footways had been in some measure cleared, it was more than six feet. It was nearly impossible for any carriage to force a passage, and few ventured on the hazardous attempt. Many accidents both distressing and fatal, occurred. The distress in that abode of poverty, the *Liberty*, is excessive. In many streets and lanes the wretched inhabitants were literally blocked up in their houses, and in the attempt to go abroad, experienced every kind of misery that it is possible

to imagine. It is painful to state, that the number of deaths there have, within the last few days, been greater than at any other period, unless at the time of the plague. We are informed that eighty funerals occurred last Sunday. The coffin-makers in Cook-street can with difficulty complete their numerous orders: and we are pained to state, that not a few poor people have been lying dead in their rooms several days, from the impossibility of procuring assistance to convey them to the Hospital-fields, and the great difficulty and danger of attempting to open the ground, which is very uneven, and where the snow, in some parts, is perhaps 20 feet deep.

Canterbury. Jan. 25. From the drifted state of the roads, the communication with the metropolis was not open until Saturday, when the snow was cut through by the military at Chatham Hill, and near Gravesend; and the stages proceeded with their passengers which had been detained from Wednesday night. The mail of Thursday night arrived here late on Friday evening, the bags having been conveyed part of the distance upon men's shoulders: the bags of Friday and Saturday night arrived together on Sunday morning about ten o'clock, and yesterday the mail coach reached this city about noon.

Dalrymple, North Britain, Jan. 29.—Wednesday, the 26th, was an epoch ever to be remembered by the inhabitants of this village. The thaw of that and the preceding day had opened the Doon, formerly "bound like a rock," to a considerable distance above this; and the melting of the snow on the adjacent hills swelled the river beyond its usual depth, which burst up vast fragments of ice and congealed snow; forcing them forward with irresistible impetuosity, bending trees like wil-

lows, carrying down Skelton-bridge, and sweeping all before it. Thus proceeded the overwhelming torrent, in awful majesty, till it had accumulated a most prodigious mass of the frozen element, which, as if in wanton frolic, it heaved out into the fields on both sides, covering acres of ground many feet deep. Alternately loading and discharging in this manner, it called at a door or two in the village, as it were to apprise us of its approach. Impatient of restraint, it deserted its wonted channel, trying to make its grand entry by several courses successively in Saint Valley, and finding no one of them sufficient for its reception, it took them altogether, overrunning the whole holm at once; then appeared here in terrific grandeur, between seven and eight o'clock in the evening, when the moon, shrinking from so dreadful a sight, and concealing herself behind a cloud, and the gloom of night added to the horrors of this tremendous scene. Like a sea, it overflowed all the gardens on the east side, from the cross to the bridge, and invaded the houses behind by the doors and windows, lifting and tumbling the furniture, extinguishing the fires in a moment, and gushing out at the front doors with incredible rapidity. But its principal inroad was by the end of a bridge. Here, while the houses stood as a bank on either side, it came crashing and roaring up the street in full career, casting forth, within a few yards of the Cross, floats of ice-like millstones. By this time the houses on the west side were in the same situation with those on the east. At one place the water was running on the house-eaves, at another it was near the door head, and midway up the street, it stood three feet and a half above the door. Happily for us it did not advance five minutes longer in this direction, or the whole village had been inundated. The consternation of

spectators not unconcerned, may be more easily conceived than described. Several have lost considerably, and many families have been expelled their own houses, into which the water is yet pouring, and obliged to seek shelter from their neighbours. We are still apprehensive of another attack, which, from the present local circumstances, will, in all probability, be worse than the first.

Accidents.

The following are a few of the casualties, which have been the consequences of this severe weather.

The body of a woman was found frozen to death on the Highgate road. She proved to have been a charwoman, returning from Highgate, where she had been at work, to Pancras.

A poor woman, named Wood, while crossing Blackheath from Leigh to the village of Charlton, accompanied by her two children, was unfortunately benighted, and missed her way. After various efforts to extricate herself, she fell into a hole, and was nearly buried in the snow. From this, however, she contrived to escape, and again proceeded; but at length, being completely exhausted, and her children benumbed with cold, she was constrained to sit down on the trunk of a tree, where wrapping her children in her cloak, she endeavoured by loud cries to attract the attention of some passengers. Her shrieks at length were heard by a waggoner, who humanely waded through the snow to her assistance, and taking her children, who seemed in a torpid state, in his arms, conducted her to a public-house; one of her poor infants was found to be completely dead, and the other was recovered with extreme difficulty.

As a party of workmen were clearing away

the snow, which was twelve feet deep, at Kip-ton, on the border of Northamptonshire, a child about three years old was discovered, and immediately afterwards, the mother, as was soon ascertained. The poor woman proved to be the wife of a soldier of the 16th regiment, and she was returning home with her child after accompanying her husband to the place of embarkation. The poor unfortunates, it was supposed, had been a week in the snow.

A respectable, well dressed man was found lying in the road leading from Longford to Upham, frozen to death. The deceased turned out to be a Mr. Apthorne, a grazier, at Coltsworth. He had left Hounslow at dusk on Monday evening, after having drunk rather freely, and proposed to go that night to Marlow. His horse was found in a field on the road side, and had evidently been down. He had property to the amount of 60*l.* in his pockets, besides a watch and pocket book.

On his return from Wakefield market, Mr. Husband, of Holroyd Hall, was found frozen to death, within little more than an hundred yards of the house of his nephew, with whom he resided.

Mr. Chapman, organist, and master of the central school at Andover, Hants, was frozen to death on Tuesday, near Wallop, in that county.--A young man of the name of Monk, while driving a stage-coach near Ryegate, was thrown off the box on a lump of frozen snow, and killed on the spot.

The Thermometer during this intense frost was as low as 7° and 8° of Fahrenheit, in the neighbourhood of London.

CHAPTER I.

Frost.

This is the state of man : to day he puts forth
The tender leaves of hope, to morrow blossoms ;
And bears his blushing honours thick upon him ;
The third day comes a FROST, a *killing frost* :
And when he thinks, good easy man, full surely
His greatness is a ripening, nips his root,
And then he falls. SHAKSPEARE.

OF all known substances, the atmosphere either absorbs or throws out heat with the most remarkable facility : and in one or other of these states, it always is with respect to the surface of the earth, and such bodies as are placed on or near it ; for these, properly speaking, have no temperature of their own, but are entirely regulated by that of the atmosphere.—When the air has been for some time absorbing the heat from terrestrial bodies, a frost must be the undoubted consequence, for the same reason that water freezes in a vessel which is placed in a freezing mixture ; and were this absorption to

continue for a length of time, the whole earth would be converted into a frozen mass. There are, however, certain powers in nature, by which this effect is always prevented; and the most violent frost we can imagine must always, as it were, defeat its own purposes, and end in a thaw.

Freezing.

THIS is the fixing a fluid body into a firm or solid mass by the action of cold.

A computation of the force of freezing water has been made by the Florentine Academicians, from the bursting of a very strong brass globe or shell, by freezing water in it; when, from the known thickness and tenacity of the metal, it was found that the expansive power of a spherule of water, only one inch in diameter, was sufficient to overcome a resistance of more than 27,000 pounds, or 13 tons and a half.

Cold also usually tends to make bodies *electric*, which are not so naturally, and to increase the electric properties of such as are so. And it is further found, that all substances do not transmit cold equally well; but that the best conductors of electricity, viz. metals, are like-

wise the best conductors of cold. It may further be added, that when the cold has been carried to such an extremity as to render any body an electric, it then ceases to conduct the cold as well as before. This is exemplified in the practice of the Laplanders and Siberians: where, to exclude the extreme cold of the winters from their habitations the more effectually, and yet to admit a little light, they cut pieces of ice, which in the winter time must always be electric in those countries, and put them into their windows; which they find to be much more effectual in keeping out the cold than any other substance.

Excessive degrees of cold occur naturally in many parts of the globe in the winter season.

Although the thermometer in this country hardly ever descends so low as 0, yet, in the winter of 1780, Mr. Wilson of Glasgow observed, that a thermometer laid on the snow sunk to 25° below 0; and Mr. Derham, in the year 1708, observed in England, that the mercury stood within one-tenth of an inch of its station when plunged into a mixture of snow and salt. At Petersburg, in 1732, the thermometer stood at 28° below 0; and when the French academicians win-

tered near the polar circle, the thermometer sunk to 33° below 0; and in the Asiatic and American continents, still greater degrees of cold are often observed.

Wonderful Expansion of Water in the act of freezing.

WATER and some other fluids suddenly dilate and expand in the act of freezing, so as to occupy a greater space in the form of ice than before, in consequence of which it is that ice is specifically lighter than the same fluid, and floats in it. And the degree of expansion of water, in the state of ice, is by some authors computed at about $\frac{1}{10}$ of its volume. Oil, however, is an exception to this property, and quicksilver too, which shrinks and contracts still more after freezing. Mr. Boyle relates several experiments of vessels made of metal, very thick and strong; in which, when filled with water, close stopped, and exposed to the cold, the water being expanded in freezing, and not finding either room or vent, bursts the vessels. A strong barrel of a gun, with water in it close stopped and frozen, was rent the whole length. Huygens, to try the force with which it expands, filled a cannon with it, whose sides were an inch

thick, and then closed up the mouth and vent, so that none could escape; the whole being exposed to a strong freezing air, the water froze in about 12 hours, and burst the piece in two places. Mathematicians have computed the force of the ice upon this occasion; and they say, that such a force would raise a weight of 27720 pounds.

Major Edw. Williams, of the Royal Artillery, made many experiments on the force of it, at Quebec, in 1784 and 1785. He filled all sizes of iron bomb-shells with water, then plugged the fuze-hole close up, and exposed them to the strong freezing air of the winter in that climate; sometimes driving in the iron plugs as hard as possible with a sledge hammer; and yet they were always thrown out by the sudden expansion of the water in the act of freezing, like a ball shot by gunpowder, sometimes to the distance of between 400 and 500 feet, though they weighed nearly 3 pounds; and when the plugs were screwed in, or furnished with hooks or barbs, to lay hold of the inside of the shell so that they could not possibly be forced out in this case; the shell was always split in two, though the thickness of the metal of the shell was about an inch and three quarters. It is

further remarkable, that through the circular crack, round about the shells, where they burst, there stood out a thin film or sheet of ice, like a fin; and in the cases when the plugs were projected by freezing water, there suddenly issued from the fuze-hole a bolt of ice of the same diameter, and stood over it to the height sometimes of 8 inches and a half. And hence we need not be surprised at the effects of ice in destroying the substance of vegetables and trees, and even splitting rocks, when the frost is carried to excess.

Thames frozen 1715-16.

THE beauties and usefulness of the Thames, have been almost an endless theme; we shall here describe, how it has contributed at various eras, to the amusement of thousands, when in a *frozen state*. In the frost of 1715-16, this advertisement appeared, "This is to give notice to gentlemen and others, that pass upon the Thames during this frost, that over against Whitehall-stairs, they may have their names printed, fit to paste in any book, to hand down the memory of the season to future ages.

You that walk there, and do design to tell
 Your children's children *what* this year befell,
 Go *print* your names, and take a *dram* within;
 For such a year as *this*, has seldom been."

Dawks's News-letter of 14th of Jan. says, "The Thames seems now a solid rock of ice; and booths for the sale of brandy, wine, ale, and other exhilarating liquors, have been for some time fixed thereon; but now it is in a manner like a town: thousands of people cross it, and with wonder view the mountainous heaps of water, that now lie congealed into ice. On Thursday, a great cook's-shop was erected, and gentlemen went as frequently to dine there, as at any ordinary. Over against Westminster, Whitehall, and Whitefriars, Printing-presses are kept upon the ice, where many persons have their names printed, to transmit the wonders of the season to posterity."

Coaches, waggons, carts, &c. were driven on it, and an enthusiastic preacher, held forth to a motley congregation *on the mighty waters*, with a zeal *fiery* enough to have *thawed himself* through the ice, had it been susceptible of *religious* warmth. This, with other pastimes and diversions, attracted the attention of many of the nobility, and even brought the Prince of Wales, to visit FROST FAIR.

On that day, there was an uncommonly high spring-tide, which overflowed the cellars on the banks of the river, and raised the ice full *fourteen* feet, without interrupting the people from their pursuits. The Protestant Packet, of this period, observes, that the theatres were almost deserted. The News-letter of February 15, announces the dissolution of the ice, and with it the "*baseless fabric*" on which Momus had held his temporary reign; the above paper then proclaims the good fare, and various articles to be seen, and purchased.

"Thou beauteous River Thames, whose *standing* tide
 Equals the glory of thy *flowing* pride,
 The city, nay the world's transferr'd to thee,
 Fix'd as the land, and richer than the sea.
 The various metals, Nature can produce,
 Or Art improve, for ornament or use,
 From the Earth's deepest bowels brought, are made
 To shine in thee, and carry on thy trade.
 Here Guilleaun, fam'd for making *silver* pass
 Through various forms; and Sparks as fam'd for brass,
 There's T—, 'twen God and *gold* who ne'er stood
 neuter,
 And trusty Nicholson, who lives by *pewter*,
 Wrote o'er their doors, having affix'd their names,
We under-writ, remov'd are to the Thames.
 There miles together for the common good,
 The Slippery Substance offers dainty food.
 Here healing *Port* wine, and there *Rhenish* flows,
 Here *Bohea Tea*, and there *Tobacco grows*.

In one place you may meet good Cheshire *cheese*,
 Another proffers, whitest Brentford *peas* :
 Here is King George's picture, there Queen Anne's,
 Now nut-brown *ale* in cups, and then in capps :
 One sells an Oxford *dram* as good as can be,
 Another offers General Peper's *brandy*.
 See! there's the *Mall*, and in that little hut
 The best *Geneva's* sold, and *love* to boot.
 See there, a sleek *Venetian* Envoy walks ;
 See here, an Alderman more proudly stalks.
 Behold the *French* Ambassador, that's *he* ;
 And this the honest Sire, and Captain Leigh.
 Here is St. *James's* Street, yonder the *Strand* :
 In this place Bowyer plies ; that's Lintot's stand."

Thames frozen 1739-40.

THE winter of 1739-40, became memorable from its uncommon severity, and the occurrence of one of the most *intense frosts* that had ever been known in this country, and which from its piercing cold, and long continuance, has been recorded in our annals by the appellation of the GREAT FROST.

It commenced on *Christmas-day*, and lasted till the *seventeenth* of the following FEBRUARY, when it began to break up, but was not wholly dissipated till near the end of the month. The distress which it occasioned among the poor and labouring classes of London, was ex-

treme: *coals* could hardly be obtained for money, and *water* was equally scarce.

The *watermen* and *fishermen*, with a *petter-boat* in mourning, and the *carpenters*, *bricklayers*, &c. with their tools and utensils in mourning, walked through the streets in *large bodies*, imploring relief for their own and families' necessities; and, to the honour of the British character, this was *liberally bestowed*. SUBSCRIPTIONS were also made in the different parishes, and great benefactions bestowed by the opulent, through which the calamities of the season were much mitigated.

A few days after the frost had set in, great damage was done among the *shipping* in the river Thames by a high wind, which broke many vessels from their moorings, and drove them foul of each other, while the large flakes of ice there floated on the stream, overwhelmed various boats and lighters, and sunk several corn and coal vessels. By these accidents many lives were lost; and many others were also destroyed by the intenseness of the cold, both on land and water. *Above Bridge*, the Thames was completely frozen over, and tents and numerous booths were erected on it for

selling liquors, &c. to the multitudes that daily flocked thither for curiosity or diversion. The scene here displayed was very irregular, and had more the appearance of a fair on land, than of a frail exhibition, the only basis of which was congealed water.

Various shops were opened for the sale of toys, cutlery, and other light articles; even a *printing-press* was established, and all the common sports of the populace in a wintery season, were carried on with augmented spirit, in despite or forgetfulness of the distress which reigned on shore. Many of the houses which at that time stood upon London-Bridge, as well as the bridge itself, received considerable damage when the thaw commenced, by the driving of the ice.

The following is an exact copy, of one of the papers printed upon the Thames, during the memorable frost of 1740.—The gentleman, whose name appears in it, (WILLIAM NOBLE, M. A.) had been *one* (of a great number without doubt) who had their *names* printed upon the ICE, as a rarity, not likely again to happen.

The original is in the possession of a gentleman of Whitehaven; but it is not

known *who* the Mr. NOBLE was, whose name and designation it bears.

“The noble Art and mystery of PRINTING, was first invented by J. FAUST, 1441, and publicly practised by JOHN GOTTENBURGH, a soldier at *Mentz*, in High Germany, *anno* 1450. King HENRY VI. (*anno* 1457) sent two *private* messengers, with fifteen hundred marks, to procure *one* of the workmen. These prevailed on FREDERICK CORSELLIS, to leave the Printing-house, in disguise; who immediately came over with them, and first instructed the ENGLISH, in this most famous Art, at OXFORD, in the year 1459.

“ WILLIAM NOBLE, M. A.

“ Amidst the Arts which on the THAMES appear,
To tell the wonders of this *icy* year,
PRINTING claims prior place, which at one view
Erects a monument of THAT and YOU.

“ Printed upon the river THAMES, Jan. 29th, in the thirteenth year of the reign of King GEORGE the IIId. Anno Dom. 1740.”

Frost of 1767-68.

THE beginnings of these years were both distinguished by a very severe *frost*, through which the price of provisions was greatly enhanced. The navigation of the river Thames was stopped, and the river *below Bridge* had all the appearance of a GENERAL WRECK; ships, boats, and small craft, lying in confusion amidst the ice, while others were either driven on shore or sunk by the driving shoals. Many persons perished by the severity of the weather, both on the water and on shore. During the latter frost, the price of butchers' meat grew so exorbitant, that the Hon. Thomas Harley, Lord Mayor, proposed that bounties should be given for bringing fish to Billingsgate market; and this plan having been carried into effect, the distresses of the poor were greatly alleviated, by the cheap rates at which the markets were supplied.

Thames frozen 1788-89.

IN 1788, a frost began on the twenty-fifth of November, and lasted seven weeks. On the fifth of January, the

Thermometer stood at eleven degrees below the freezing point, in the very midst of the city. The Thames was completely frozen over, below London bridge, and from the variety of booths, &c. erected on the ice it assumed all the appearance of a fair; even puppet shows and wild beasts were exhibited.

The following diary of remarkable events during this severe frost, is taken from the Gentleman's Magazine for 1789.

Saturday, Jan. 10, 1789.—Thirteen men brought a waggon with a ton of coals from Loughborough, in Leicestershire, to Carlton House, as a present to His Royal Highness the Prince of Wales. As soon as they were emptied into the cellar, Mr. Weltjie, clerk of the cellars, gave them four guineas; and as soon as the Prince was informed of it, his Highness sent them 20 guineas, and ordered them a pot of beer each man. They performed their journey, which is 111 miles, in 11 days, and drew it all the way without any relief.

Monday 12.—A young bear was baited on the ice, opposite to Redriff, which drew multitudes together, and fortunately no accident happened to interrupt their sport.

Tuesday 13.—The Prince of Wales

transmitted £1000 to the Chamberlain for the benefit of the poor, during the severe frost.

Saturday 17.—The captain of a vessel lying off Rotherhithe, the better to secure the ship's cables, made an agreement with a publican for fastening a cable to his premises; in consequence, a small anchor was carried on shore and deposited in the cellar, while another cable was fastened round a beam in another part of the house. In the night the ship veered about, and the cables holding fast, carried away the beam and levelled the house with the ground; by which accident five persons asleep in their beds were killed.

In the *common place notes* for February, 1789, it is remarked, 'With the new year, new entertainments commenced, or more properly speaking, old sports were revived in the neighbourhood of London. The river Thames, which at this season usually exhibits a dreary scene of languor and indolence, was this year the stage on which there were all kinds of diversions, bear-baiting, festivals, pigs and sheep roasted, booths, turnabouts, and all the various amusements, of Bartholomew fair multiplied and improved; from Putney-bridge in Middlesex, down

to Redriff, was one continued scene of merriment and jollity ; not a gloomy face to be seen, nor a countenance expressive of want ; but all cheerfulness, originating apparently from business and bustle. From this description the reader is not, however, to conclude that all was as it seemed. The miserable inhabitants that dwelt in houses on both sides the river during these thoughtless exhibitions, were many of them experiencing the extreme of misery : destitute of employment, though industrious, they were with families of helpless children, for want of employment, pining for want of bread ; and though in no country in the world the rich are more extensively benevolent than in England, yet their benefactions could bear no proportion to the wants of the numerous poor, who could not all partake of the common bounty. It may, however, be truly said, that in no great city or country on the continent of Europe, the poor suffered less from the rigour of the season, than the inhabitants of Great Britain and London.

Yet, even in London, the distresses of the poor were very great ; and though liberal subscriptions were raised for their relief, many perished through want and cold.

On this occasion, the CITY of LONDON
 SUBSCRIBED FIFTEEN HUNDRED
 POUNDS TOWARDS SUPPORTING THOSE
 PERSONS WHO WERE NOT IN THE HABIT
 OF RECEIVING ALMS.

Thames frozen 1814.

THE history of this great frost has already been detailed in our Introduction. We shall now confine ourselves to the events which took place on the marble bosom of the now flowing Thames, from the 30th of January to the 7th of February inclusive.

Sunday, Jan. 31.—Immense masses of ice that had floated from the upper parts of the river, in consequence of the thaw on the two preceding days, now blocked up the Thames between Blackfriars' and London Bridge; and afforded every probability of its being frozen over in a day or two. Some venturous persons even now walked on different parts of the ice.

Monday, Jan. 31.—This expectation was realized. During the whole of the afternoon, hundreds of people were assembled on Blackfriars' and London Bridges, to see several adventurous men cross and recross the Thames on the ice; at one time seventy persons were counted walking from Queenhithe to the opposite shore. The frost on Sunday night so united the vast mass as to render it immovable by the tide.

Tuesday, Feb. 1.—The floating masses of ice with which we have already stated the Thames to be covered, having been stopped by London Bridge,

now assumed the shape of a solid surface over that part of the river which extends from Blackfriars' Bridge to some distance below Three Crane Stairs, at the bottom of Queen-street, Cheapside. The watermen taking advantage of this circumstance, placed notices at the end of all the streets leading to the city side of the river, announcing a safe foot-way over the river, which, as might be expected, attracted immense crowds to witness so novel a scene. Many were induced to venture on the ice, and the example thus afforded, soon led thousands to perambulate the rugged plain, where a variety of amusements were prepared for their entertainment.

Among the more curious of these was the ceremony of roasting a small sheep, which was *toasted*, or rather burnt, over a coal fire, placed in a large iron pan. For a view of this *extraordinary* spectacle, *sixpence* was demanded, and willingly paid. The delicate meat when *done*, was sold at *a shilling a slice*, and termed *Lapland mutton*. Of booths there were a great number, which were ornamented with streamers, flags, and signs, and in which there was a plentiful store of those favourite luxuries, *gin*, *beer*, and *gingerbread*.

Opposite Three Crane Stairs there was a complete and well frequented thoroughfare to Bank-side, which was strewed with ashes, and apparently afforded a very safe, although a very rough path. Near Blackfriars' Bridge, however, the path did not appear to be equally safe; for one young man, a plumber, named *Davis*, having imprudently ventured to cross with some lead in his hands, he sank between two masses of ice, to rise no more. Two young women nearly shared a similar fate, but were happily rescued from their perilous situation by the prompt efforts of two watermen. Many a fair

nymph indeed was embraced in the *icy arms* of old Father Thames;—three prim young Quakeresses had a sort of *semi-bathing*, near London Bridge, and when landed on *terra firma*, made the best of their way through the Borough, and amidst the shouts of an admiring populace, to their residence at Newington.

In consequence of the impediments to the current of the river at London Bridge, the tide did not ebb for some days more than one half the usual mark.

Wednesday, Feb 2.—The same sports were repeated, and the Thames presented a complete FROST FAIR. The grand mall or walk was from Blackfriars' Bridge to London Bridge; this was named, '*The City Road*,' and lined on each side with tradesmen of all descriptions. Eight or ten printing presses were erected, and numerous pieces commemorative of the 'great Frost' were *actually printed* on the ice. Some of these frosty typographers displayed considerable taste in their specimens. At one of the presses, an orange-coloured standard was hoisted, with the watch-word ORANGE BOVEN in large characters, and the following papers were issued from it.

" Frost Fair.

" Amidst the Arts which on the THAMES appear,
To tell the wonders of this *icy* year,
PRINTING claims prior place, which at one view
Erects a monument of THAT and YOU."

Another:

" You that walk here, and do design to tell
Your children's children what this year befell,
Come, buy this print, and it will then be seen
That such a year as this has seldom been."

Another of these *stainers of paper* addressed the spectators in the following terms: “*Friends, now is your time to support the Freedom of the Press. Can the press have greater liberty? Here you find it working in the middle of the Thames; and if you encourage us by buying our impressions, we will keep it going in the true spirit of liberty during the frost.*” One of the articles printed and sold contained the following lines:

“ Behold, the River Thames is frozen o’er,
Which lately slips of mighty burden bore;
Now different arts and pastimes here you see,
But printing claims the superiority.”

Besides the above, the Lord’s Prayer, and several other pieces were issued from these icy printing-offices, and which were bought with the greatest avidity.

Thursday, Feb. 3.—The adventurers were still more numerous. Swings, bookstalls, dancing in a barge, sutting-booths, playing at skittles, and almost every appendage of a Fair on land was now transferred to the Thames. Thousands of people flocked to behold this singular spectacle, and to partake of the various sports and pastimes. The ice now became like a solid rock of adamant, and presented a truly picturesque appearance. The view of St. Paul’s and of the city with the white foreground had a very singular effect;—in many parts, mountains of ice were upheaved, and these fragments bore a strong resemblance to the rude interior of a stone quarry.

Friday, Feb. 4.—Every day brought a fresh accession of “pedlars to sell their wares;” and the greatest rubbish of all sorts was raked up and sold at double and treble the original cost.

Books and toys labelled 'bought on the Thames,' were seen in profusion. The *watermen* profited exceedingly, for each person paid a toll of 2d. or 3d. before he was admitted to Frost Fair; some *douceur* also was expected on your return. These men are said to have taken 6l. each in the course of a day.

This afternoon, about five o'clock, three persons, an old man and two lads, having ventured on a piece of ice above London Bridge, it suddenly detached itself from the main body, and was carried by the tide through one of the arches. The persons on the ice, who laid themselves down for safety, were observed by the boatmen at Billingsgate, who, with laudable activity, put off to their assistance, and rescued them from their impending danger. One of them was able to walk, but the other two were carried, in a state of insensibility to a public-house, where they received every attention their situation required.

Many persons were seen on the ice till late at night, and the effect by *moonlight* was singularly picturesque and beautiful. With a little stretch of imagination, we might have transported ourselves to the frozen climes of the north;—to Lapland, Sweden, or Holland.

Saturday, Feb. 5.—The morning of this day augured rather unfavourably for the continuance of FROST FAIR. The wind had shifted to the south, and a light fall of snow took place. The visitors of the Thames, however, were not to be deterred by trifles. Thousands again ventured, and there was still much life and bustle on the frozen element.

The foot-path in the centre of the river was hard and secure, and among the pedestrians we observed

four donkies, which trotted a nimble pace, and produced considerable merriment. At every glance, the spectator met with some pleasing novelty. Gaming, in all its branches, threw out different allurements, while honesty was out of the question. Many of the itinerant admirers of the profits gained by *E O Tables*, *Rouge et Noir*, *Te-totum*, wheel of fortune, the garter, &c. were industrious in their avocations, leaving their kind customers without a penny to pay the passage over a plank to the shore. Skittles was played by several parties, and the drinking tents filled by females and their companions, dancing reels to the sound of fiddles, while others sat round large fires, drinking rum, grog, and other spirits. Tea, coffee, and eatables, were provided in ample order, while the passengers were invited to eat by way of recording their visit. Several respectable tradesmen also attended with their wares, selling books, toys, and trinkets of every description.

Towards the evening, the concourse became thinned; rain fell in some quantity;—**MAISTER ICE** gave some *loud cracks*, and floated with the printing presses, booths, &c. to the no small dismay of publicans, typographers, &c. In short, this icy palace of Momus, this fairy frost work, was soon to be dissolved, and was doomed to vanish, like the baseless fabric of a vision,—‘but leaving *some wrecks* behind.’

A short time previously to this great event, a gentleman standing by one of the printing presses, and supposed to be a *limb of the law*, handed the following *jeu d’esprit* to its conductor; requesting that it might be printed on the Thames. The prophecy which it contains has been most remarkably fulfilled.

“ *To Madam Tabitha Thaw.*

“ Dear dissolving dame,

“ FATHER FROST and SISTER SNOW have *boneyed* my borders, formed an *idol of ice* upon my bosom, and ail the LADS OF LONDON come to make merry : now as you love mischief, treat the multitude with a few CRACKS by a sudden visit, and obtain the prayers of the poor upon both banks. *Given at my own press, the 5th Feb. 1814.* THOMAS THAMES.”

It was evident that a *thaw* was rapidly taking place, yet such was the indiscretion and heedlessness of some persons, that one most fatal accident occurred.

Two genteel-looking young men fell victims to their temerity in venturing on the ice above Westminster-bridge, notwithstanding the warnings of the watermen. A large mass on which they stood, and which had been loosened by the flood tide, gave way, and they floated down the stream. As they passed under Westminster-bridge they cried out most piteously for help. They had not gone far before they sat down, but both going too near the edge they overbalanced the mass, and were precipitated into the stream, sinking to rise no more.

This morning also Mr. Lawrence, of the Feathers, in High Timber-street, Queenhithe, erected a booth on the Thames opposite Brook's Wharf, for the accommodation of the curious. At nine at night he left it to the care of two men, taking away all the liquors, except some gin, which he gave them for their own use :—

Sunday, Feb 6.—At two o'clock this morning, the tide began to flow with great rapi-

dity at London-bridge ; the thaw assisted the efforts of the tide, and the booth just mentioned was hurried along with the quickness of lightning towards Blackfriars-bridge. There were nine men in it, and in their alarm they neglected the fire and candles, which communicating with the covering, set it in a flame. The men succeeded in getting into a lighter which had broken from its moorings, but it was dashed to pieces against one of the piers of Blackfriars-bridge, on which seven of them got, and were taken off safely ; the other two got into a barge while passing Puddle-dock.

On this day, the Thames towards high tide (about 3 p. m.) presented a very tolerable idea of the *Frozen Ocean*;—grand masses of ice floating along, added to the great height of the water, afforded a striking object for contemplation. Thousands of disappointed persons thronged the banks;—and many a 'prentice boy, and servant maid, 'sighed unutterable things,' at the sudden and unlooked for destruction of FROST FAIR.

Monday, Feb. 7.—Large masses of ice are yet floating, and numerous lighters, broken from their moorings, are seen in different parts of the river; many of them complete wrecks. The damage done to the craft and barges is supposed to be very great. From London-bridge to Westminster, Twenty Thousand Pounds will scarcely make good the losses that have been sustained. While we are now writing, (half past 2 p. m.) *a printing press has been again set up on a large ICE-ISLAND*, between Blackfriars and Westminster-bridges. At this *new printing-office*, the remainder of a large impression of the *Title-page* of the present work is now actually being printed, so that the purchasers of FROSTIANA, will have this additional advantage.

Freezing Rain, or Raining Ice.

THIS is a very uncommon kind of shower, which fell in the west of England in December, 1672. This rain, as soon as it touched any thing above ground, as a bough or the like, immediately settled into ice; and, by multiplying and enlarging the icicles, broke all down with its weight. The rain that fell on the snow immediately froze into ice, without sinking in the snow at all. It made an incredible destruction of trees, beyond any thing in all history. "Had it concluded with some gust of wind (says a gentleman on the spot,) it might have been of terrible consequence. I weighed the sprig of an ash tree, of just three quarters of a pound, the ice on which weighed 16 pounds. Some were frightened with the noise in the air; till they discerned it was the clatter of icy boughs, dashed against each other." Dr. Beale observes, that there was no considerable frost observed on the ground during the whole; whence he concludes, that a frost may be very intense and dangerous on the tops of some hills and plains; while in other places, it keeps at two, three, or four feet distance above the ground, rivers, lakes, &c. The frost was followed by a forwardness of flowers and fruits.

Influence of Frost on Health.

The salutary influence of frosty seasons on the health of mankind is not in the least confirmed by the annual bills of mortality; as many old and debilitated persons, whose vital heat is insufficient to excite into action their vessels, already too unsusceptible of irritation, die in consequence of long frosts, during severe winters. Birds, and other wild animals, as well as tender vegetables, perish benumbed from the same cause.

It deserves, however, to be remarked, that a sharp dry frost does not affect the human skin with that sensation of chilly and piercing cold which we experience, when the air is loaded with moisture, the temperature of which is near the freezing point. This remarkable difference arises from the intense degree of cold produced by the evaporation of fluids, which continually takes place on the surface of living bodies, where it naturally produces a more perceptible effect, than the simple contact of *dry* air would occasion, when it is but a few degrees below freezing.

To the young and robust, frost is more pleasing than moist air; as, in the former, they are able to keep themselves warm by increased exercise; which, in the latter, only tends to promote and ren-

der the evaporation more severely felt on the skin. For the same reason, severe and continued frosts destroy the children of the poor, who want both food, fire, and clothing in this harsh climate:

In cold countries, the frost frequently proves fatal to mankind, not only producing mortification, but even death itself. The hands of those unfortunate persons, who die in consequence of intense cold, are first seized, till they lose the sense of feeling; next a drowsiness pervades the whole body, which, if indulged in, is attended with imperceptible dissolution.

Frozen Market

AT ST. PETERSBURGH.

To strangers, unaccustomed to the various changes produced in men and things, by the influence of intense frost, nothing appears more wonderful or noteworthy than that part of the city dedicated to the sale of frozen provisions. Your astonished sight is there arrested by a vast open square, containing the bodies of many thousand animals, piled in pyramidal heaps, on all sides—cows, sheep, hogs, fowls, butter, eggs, fish, all stiffened into granite.

The fish are attractively beautiful, possessing the vividness of their living colour, with the transparent clearness of wax imitations. The beasts present a far less pleasing spectacle—most of the larger sort being skinned, and classed according to their species: groupes of many hundreds are seen piled upon their hind legs against one another, as if each were making an effort to climb over the back of its neighbour. The motionless, yet apparent animation of their seemingly struggling attitudes (as if suddenly seized in moving, and petrified by frost,) gives a horrid life to this dead scene. Had an enchanter's wand been instantaneously waved over this sea of animals during their different actions, they could not have been fixed more decidedly. Their hardness, too, is so extreme, that the natives chop them up for the purchasers like wood.

The provisions collected here, are the product of countries many thousand wersts distant. Siberia, Archangel, and still remoter provinces, furnish the merchandize, which, during the frost's severity, is conveyed hither on sledges. In consequence of the multitudes of these commodities, and the short period allowed to the existence of the market, they are cheaper than at any other period of

the year ; and are, therefore, bought in large quantities to be laid up as a winter stock. When deposited in cellars, they keep for a length of time.

At certain hours, every day, the market, while it lasts, is a fashionable lounge. There you meet all the beauty and gaiety of St. Petersburg, even from the Imperial family down to the Russian merchant's wife. Incredible crowds of sledges, carriages, and pedestrians, throng the place; the different groupes of spectators, purchasers, venders, and commodities, form such an extraordinary spectacle as no other city is known to equal.

Chronological Table

OF REMARKABLE FROSTS THROUGHOUT EUROPE.

A. D.

220, A frost in Britain lasted 5 months.

250, The Thames frozen 9 weeks.

291, Rivers in Britain frozen 6 weeks.

359, Frost in Scotland for 14 weeks.

508, Rivers in Britain frozen 2 months.

695, Thames frozen 6 weeks, and booths built on it.

759, Frost from Oct. 1, till Feb. 26, 760.

827, Frost in England for 9 weeks.

923, The Thames frozen 13 weeks.

A. D.

- 987, Frost lasted 120 days: began Dec. 22.
 998, The Thames frozen 5 weeks.
 1035, Severe frost on June 24: the corn
 and fruits destroyed.
 1063, The Thames frozen 14 weeks.
 1076, Frost in England from Nov. till
 April 1077.
 1205, Frost from Jan. 15, till March 22.
 1407, Frost that lasted 15 weeks.
 1434, From Nov. 24, till Feb. 10, 1435.
Thames frozen down to Gravesend.
 1683, Frost for 13 weeks.
 1708-9, Severe frost for many weeks.
 1739-40, One for 9 weeks; began Dec. 24.
 1742, Severe frost for many weeks.
 1747, Severe frost in Russia.
 1754, Severe one in England.
 1767-68, Severe frost; navigation of the
 Thames stopped.
 1776, The same in England.
 1788-89, The Thames frozen below
 bridge; and booths erected on it.
 1791, Frost and snow in different parts
 of England, at Midsummer.
 1794, Hard frost of many weeks. Ther-
 mometer at London, mostly at
 20 below 0 of Fahrenheit.
 1796, Most intense cold on Christmas-day.
 1813-14 A frost of almost unparalleled
 severity commenced Dec. 27,
 and broke up February 5.

CHAPTER II.

Snow.

Thro' the hushed air the whitening shower descends,
 At first thin wavering ; till, at last, the flakes
 Fall broad, and wide, and fast, dimming the day,
 With a continual SNOW. THOMSON.

SNOW is formed by the freezing of the vapours in the atmosphere. The snow we receive may, properly enough be ascribed to the coldness of the atmosphere through which it falls. When the atmosphere is warm enough to dissolve the snow, before it arrives to us, we call it *rain* ; if it preserve itself undissolved, it makes what we call *snow*. It differs from the particles of hoarfrost, in being crystallized, as it were, which they are not. This appears on the examination of a flake of snow by a magnifying glass ; when the whole of it will seem composed of fine shining spicula, or points, diverging like rays from a centre.

As the flakes fall down through the atmosphere, they are continually joined

by more of these radiated spicula, and thus increase in bulk like the drops of rain or hailstones. Dr. Grew, in a discourse on the nature of snow, observes that many parts of it are of a regular figure, for the most part, so many little rowels or stars of six points, and are as perfect and transparent ice as any we see on a pond. Upon each of these points are other collateral points, set at the same angles as the main points themselves: among which there are divers others irregular, which are chiefly broken points, and fragments of the regular ones. Others also, by various winds, seem to have been thawed, and frozen again into irregular clusters; so that it seems as if the whole body of snow were an infinite mass of icicles irregularly figured. That is, a cloud of vapours being gathered into drops, those drops forthwith descend, and, in their descent, meeting with a freezing air as they pass through a colder region, each drop is immediately frozen into an icicle, shooting itself forth into several points; but these, still continuing their descent, and meeting with some intermitting gales of warmer air, or in their continual waftage to and fro, touching upon each other, are a little thawed, blunted, and frozen into clus-

ters, or entangled so as to fall down in what we call *flakes*.

According to Signior Beccaria, clouds of snow differ in nothing from clouds of rain, but in the circumstance of cold that freezes them. Both the regular diffusion of snow, and the irregularity of the structure of its parts (particularly some figures of snow or hail, which he calls *rosette*, and which fall about Turin,) show the clouds of snow to be acted upon by some uniform cause, like electricity. He even endeavours, very particularly, to show in what manner certain configurations of snow are made by the uniform action of electricity. He was confirmed in his reasonings on this subject by observing, that his apparatus never failed to be electrified by snow as well as by rain; and, he adds, that a more intense electricity unites the particles of hail more closely than the more moderate electricity does those of snow.

Snow, although it seems to be soft, is really hard, because it is true ice. It seems soft, because, at the first touch of the finger upon its sharp edges or points, they melt; otherwise they would pierce the finger like so many lancets. The lightness of snow, although it is firm ice, is owing to the excess of its surface, in

comparison to the matter contained under it ; and thus gold, the most ponderous of all bodies, when beaten into leaves, will ride upon the least breath of air. The whiteness of snow is owing to the small particles into which it is divided ; for ice, when pounded, will become equally white.

The beauties of Snow have been abundantly illustrated by poets, both antient and modern ; but what can be more minutely circumstantial, or more elegantly accurate, than the following description of Snow from our own admirable poet of the Seasons?

The keener tempests rise: and, foaming dun
From all the livid east, or piercing north,
Thick clouds ascend ; in whose capacious womb
A vapoury deluge lies, to snow congealed.
Heavy they roll their fleecy world along ;
And the sky saddens with the gathered storm.

The cherished fields
Put on their winter robe of purest white.
'Tis brightness all ; save where the new snow melts
Along the mazy current. Low, the woods
Bow their hoary head ; and, ere the languid sun
Faint from the West emits his evening ray,
Earth's universal face, deep hid, and chill,
Is one wide dazzling waste, that buries wide
The works of man.

The same author has beautifully described the effects which the inclemency

of the season has upon animals, and particularly the feathered tribes, while the snow is upon the ground.

Drooping, the labourer-ox
 Stands cover'd o'er with snow, and then demaunds
 The fruit of all his toil. The fowls of heaven,
 Tam'd by the cruel season, croud around
 The winnowing store, and claim the little boon
 Which Providence assigns them. One alone,
 The red-breast, sacred to the household gods,
 Wisely regardful of the embroiling sky,
 In joyless fields and thorny thickets leaves
 His shivering mates, and pays to trusted Man
 His annual visit. Half afraid, he first
 Against the window beats; then, brisk, alights
 On the warm hearth; then, hopping o'er the floor,
 Eyes all the smiling family askance,
 And pecks, and starts, and wonders where he is:
 Till more familiar grown, the table-crums
 Attract his slender feet. The foodless wilds
 Pour forth their brown inhabitants. The hare,
 Tho' timorous of heart, and hard beset
 By death in various form, dark snares, and dogs,
 And more un pitying Men, the garden seeks,
 Udg'd on by fearless Want. The bleating kind
 Eye the bleak heaven, and next the glistening earth,
 With looks of dumb despair; then, sad dispers'd,
 Dig for the wither'd herb thro' heaps of snow.

Uses of Snow.

WE are not to consider snow merely as a curious and beautiful phenomenon. The great Dispenser of universal bounty has so ordered it, that it is eminently subservient, as well as all the works of creation, to his benevolent designs. Were we to judge from appearances only, we might imagine, that so far from being useful to the earth, the cold humidity of snow would be detrimental to vegetation. But the experience of all ages asserts the contrary.

Snow, particularly, in those northern regions where the ground is covered with it for several months, fructifies the earth, by guarding the corn, or other vegetables, from the intenser cold of the air, and especially from the cold piercing winds.

It has been a vulgar opinion, very generally received, that snow fertilizes the lands on which it falls more than rain, in consequence of the nitrous salts which it is supposed to acquire by freezing. But it appears from the experiments of Margraaf, in the year 1751, that the chemical difference between rain and snow-water is exceedingly small ; and that the

latter, however, is somewhat less nitrous, and contains a somewhat less proportion of earth, than the former; but neither of them contain either earth or any kind of salt, in any quantity, which can be sensibly efficacious in promoting vegetation. Allowing, therefore, that nitre is a fertilizer of lands, which many are, upon good grounds, disposed utterly to deny, yet so very small is the quantity of it contained in snow, that it cannot be supposed to promote the vegetation of plants upon which the snow has fallen.

The peculiar agency of snow, as a fertilizer, in preference to rain, may, without recurring to nitrous salts supposed to be contained in it, be rationally ascribed to its furnishing a covering to the roots of vegetables, by which they are guarded from the influence of the atmospherical cold, and the internal heat of the earth is prevented from escaping. And hence, Budinus, in his *Theatrum Naturæ*, observes, that the Psalmist, compares snow to wool, rather on account of the warmth it affords to vegetables in the cold of winter, as woollen garments do to men, than of its fleecy resemblance.

Snow may also fertilize the earth, agreeably to the hypothesis of those who

make oil the food of plants, by means of the oily particles which it contains. Besides, snow, in melting, moistens and pulverizes the soil, which had been bound up by the frost; and, as its water has a tendency to putrefaction, it seems, on many accounts, without admitting it to contain any nitre, to be admirably fitted to promote vegetation.

Another reason of the usefulness of snow, has been suggested by Mr. Parkes. Fur and down afford warm clothing, in consequence of the air they infold within them; atmospheric air being a non-conductor of heat. 'Hence it is that the carpet which covers the earth in winter, is spread out by nature with so light a hand, that it might hold an abundance of atmospheric air within its interstices, to preserve the warmth of those innumerable tribes of vegetables which it is destined to protect.'

Artificial Snow.

AN artificial snow has been made by the following experiment. A tall phial of aqua fortis being placed by the fire till it is warm; and filings of pure silver, a few at a time, being put into it; after a

brisk ebullition, the silver will dissolve slowly. The phial being then placed in a cold window, as it cools, the silver particles will shoot into crystals, several of which running together, will form a flake, resembling snow, and descend to the bottom of the phial. While they are descending, they represent perfectly a shower of silver snow, and the flakes will lie one upon another at the bottom, like real snow upon the ground.—In a word, a shower of snow, although so common with us, and therefore so little regarded, is, in itself, a most beautiful spectacle, and is considered by the natives of southern climes, on their arrival here, as the most extraordinary and amazing phenomenon of nature.

Snow Slips.

It often happens, that when snow has long been accumulated on the tops and on the sides of mountains, it is borne down the precipice, either by means of tempests, or its own melting. At first, when loosened, the volume in motion is but small, but gathers as it continues to roll; and, by the time it has reached the habitable parts of the mountain, is gene-

rally grown of enormous bulk. Wherever it rolls it levels all things in its way, or buries them in unavoidable destruction. Instead of rolling, it sometimes is found to slide along from the top; yet even thus it is generally as fatal as before. Nevertheless, an instance has been cited, sometime since, of a small family in Germany, that lived for above a fortnight beneath one of these snow-slips. Although they were buried, during that whole time, in utter darkness, and under a bed of some hundred feet deep, yet they were luckily taken out alive; the weight of the snow being supported by a beam that kept up the roof; and nourishment being supplied them by the milk of an ass that was buried under the same ruin.

*Account of a Woman buried in the Snow
for eight days.*

A well-authenticated anecdote of a woman surviving nearly eight days, buried in the snow, without food, occurred near Impington, in Cambridgeshire; and is related by Mr. Okes, the surgeon who attended her, in the annals of medicine for the year 1799.

Elizabeth Woodcock, aged 42, of a slender, delicate make, on her return from Cambridge, on the evening of the second of February, being exhausted with running after her horse which had started from her, and becoming numbed in the hands and feet, sat down on the ground. At that time a small quantity of snow had but drifted near her, but it began to accumulate very rapidly; and when Chesterton bells had rung at eight o'clock, she was completely enclosed and penned in by it. To the best of her recollection, she slept very little during the first night.—On the morning of the third, observing before her a circular hole in the snow, about two feet in length and half a foot in diameter, running obliquely upwards, and closed with a thin covering of ice or snow, she broke off a branch of a bush that was close to her, and with it thrust her handkerchief through the hole, as a signal of distress.

In consequence of the external air being admitted, she felt herself very cold. On the second morning of her imprisonment, the hole was again closed up, and continued so till the third day, after which time it remained open. She heard distinctly the ringing of the village bells, noises on the highway, and even

the conversation of some gipsies who passed near her, but could not make herself heard. She easily distinguished day and night, and could even read an almanac she took from her pocket. The sensation of hunger ceased almost entirely after the first day.—Thirst was throughout her predominant feeling; and this she had the plentiful means of allaying, by sucking the surrounding snow. She felt no gratification from the use of her snuff. On Friday the eighth, when a thaw took place, she felt uncommonly faint and languid; and her clothes were wet quite through by the melted snow. The aperture becoming enlarged, she attempted in vain to disengage herself from her perilous situation.

On Sunday the tenth, a little after mid-day, she was discovered. A piece of biscuit and a small quantity of brandy were given her, from which she found herself greatly recruited; but she was so much exhausted, that, on being lifted into the chaise she fainted.

Mr. Okes saw her that day on her way home: he found her hands and arms sodden, but not very cold, and her pulse did not indicate the great debility which might have been expected: her legs were cold, and her feet in a great measure mortified. She was directed to be put into bed

without delay, and to take some weak broth occasionally, but no strong liquors, and not to be brought near the fire. Next day she was affected with symptoms of fever; her pulse was rising, her face was flushed, and her breathing short; occasioned, probably, by having taken too much food, and being incommoded by the crowd of visitors. Her feet were also in a complete state of mortification, her ancles cold and benumbed, and the integuments puffy. Cloths wetted with brandy were applied to her feet, some antifebrile remedies and a little opium were given her. The mortification, however, proceeded, and, on the seventeenth of March, all the toes were removed, and the bones of the heels were bare in many parts; on the seventeenth of April, the date of the last report, her appetite was becoming tolerably good, and her health was improving.

The Hot Bath and Snow-Bath.

ALMOST all the Finnish peasants have a small house built on purpose for a bath: it consists of only one small chamber, in the innermost part of which are placed a number of stones, which are heated by fire till they become red. On these

stones, thus heated, water is thrown, until the company within be involved in a thick cloud of vapour. In this innermost part, the chamber is formed into two stories for the accommodation of a greater number of persons within that small compass; and it being the nature of heat and vapour to ascend, the second story is, of course, the hottest. Men and women use the bath promiscuously, without any concealment of dress, or being in the least influenced by any emotions of attachment. If, however, a stranger open the door, and come on the bathers by surprise, the women are not a little startled at his appearance; for besides his person, he introduces along with him, by opening the door, a great quantity of light, which discovers at once to the view their situation, as well as forms. Without such an accident they remain, if not in total darkness, yet in great obscurity, as there is no other window besides a small hole, nor any light but what enters in from some chink in the roof the house, or the crevices between the pieces of wood of which it is constructed. I often amused myself (says Acerbi) with surprising the bathers in this manner, and I once or twice tried to go in and join the assembly; but the heat was so excessive that I could

not breathe, and in the space of a minute at most, I verily believe, must have been suffocated. I sometimes stepped in for a moment, just to leave my thermometer in some proper place, and immediately went out again, where I would remain for a quarter of an hour, or ten minutes, and then enter again, and fetch the instrument to ascertain the degree of heat. My astonishment was so great that I could scarcely believe my senses, when I found that those people remain together, and amuse themselves for the space of half an hour, and sometimes a whole hour, in the same chamber, heated to the 70th or 75th degree of Celsius. The thermometer, in contact with those vapours, became sometimes so hot, that I could scarcely hold it in my hands.

The Finlanders, all the while they are in this hot bath, continue to rub themselves, and lash every part of their bodies with switches formed of twigs of the birch-tree. In ten minutes they become as red as raw flesh, and have altogether a very frightful appearance. In the winter season they frequently go out of the bath, naked as they are, to roll themselves in the snow, when the cold is at even 20 and 30 degrees below zero.* They will some-

* I speak always of the thermometer of a hundred degrees, by Celsius.

times come out, still naked, and converse together, or with any one near them, in the open air. If travellers happen to pass by while the peasants of any hamlet, or little village, are in the bath, and their assistance is needed, they will leave the bath, and assist in yoking and unyoking, and fetching provender for the horses, or in any thing else, without any sort of covering whatever, while the passenger sits shivering with cold, though wrapped up in a good sound wolf's skin. There is nothing more wonderful than the extremities which man is capable of enduring through the power of habit.

The Finnish peasants pass thus instantaneously from an atmosphere of 70° degrees of heat, to one of 30 degrees of cold, a transition of a hundred degrees, which is the same thing as going out of boiling into freezing water! and what is more astonishing, without the least inconvenience; while other people are very sensibly affected by a variation of but five degrees, and in danger of being afflicted with rheumatism by the most trifling wind that blows. Those peasants assure you, that without the hot vapour baths they could not sustain as they do, during the whole day, their various labours. By the bath, they tell you, their strength

is recruited as much as by rest and sleep. The heat of the vapour mollifies to such a degree their skin, that the men easily shave themselves with wretched razors, and without soap. Had *the immortal SHAKSPEARE* known of a people who could thus have pleasure in such quick transition from excessive heat to the severest cold, his *knowledge* might have been increased, but his *creative fancy* could not have been assisted:—

Oh! who can hold a fire in his hand,
By thinking of the frosty Caucasus?
Or wallow naked in December snow
By thinking on fantastic summer's heat?

Thomson's Description of a Man lost in the Snow.

As thus the snows arise; and foul, and fierce,
All Winter drives along the darken'd air;
In his own loose-revolving fields the swain
Disaster'd stands; sees other hills ascend,
Of unknown joyless brow; and other scenes,
Of horrid prospect, shag the trackless plain:
Nor finds the river, nor the forest, hid
Beneath the formless wild; but wanders on^d
From hill to dale, still more and more astray;
Impatient flouncing thro' the drifted heaps,
Stung with the thoughts of home; the thoughts of
home
Rush on his nerves, and call their vigour forth
In many a vain attempt. How sinks his soul!
What black despair, what horror fills his heart!

When for the dusky spot, which Fancy feign'd
 His tufty cottage rising thro' the snow,
 He meets the roughness of the middle waste,
 Far from the track and blest abode of Man;
 While round him night resistless closes fast,
 And every tempest, howling o'er his head,
 Renders the savage wilderness more wild.
 Then thron'g the busy shapes into his mind,
 Of cover'd pits, unfathomably deep,
 A dire descent! beyond the power of frost,
 Of faithless bogs; of precipices huge,
 Smooth'd up with snow; and, what is land, unknown,
 What water of the still-frozen spring,
 In the loose marsh or solitary lake,
 Where the fresh fountain from the bottom boils.
 These check his fearful steps; and down he sinks
 Beneath the shelter of the shapeless drift,
 Thinking o'er all the bitterness of death,
 Mix'd with the tender anguish Nature shoots
 Thro' the wrung bosom of the dying Man,
 His wife, his children, and his friends, unseen.
 In vain for him th' officious wife prepares
 The fire fair-blazing, and the vestment warm;
 In vain his little children, peeping out
 Into the mingling storm, demand their sire,
 With tears of artless innocence. Alas!
 Nor wife, nor children, more shall he behold,
 Nor friends, nor sacred home. On every nerve
 The deadly Winter seizes; shuts up sense;
 And, o'er his inmost vitals creeping cold,
 Lays him along the snows, a stiffen'd corse,
 Stretch'd out, and bleaching in the northern blast.

CHAPTER III.

Ice.

The blasted groves their verdant pride resign,
 And waters, hardened into crystal shine ;
 Ev'n the proud Seas forget in tides to roll,
 Beneath the freezing of the northern Pole ;
 There waves on waves in solid mountains rise,
 And *Alps* of ICE invade the wond'ring skies.

BROOME.

ICE is a brittle transparent body, formed of some fluid frozen or fixed by cold. (See Chap. I. FROST.) The specific gravity of ice to water is various, according to the nature and circumstances of the water, degree of cold, &c.

The rarefaction of ice is supposed to be owing to the air-bubbles produced in it while freezing: these, being considerably large in proportion to the water frozen, render the ice so much specifically lighter. It is well known that a considerable quantity of air is lodged in the interstices of water, though it has there little or no elastic property, on account of the disunion of its particles; but upon these particles coming closer together, and uniting as the water freezes,

light, expansive, and elastic air-bubbles are thus generated, and increase in bulk as the cold grows stronger, and by their elastic force burst to pieces any vessel in which the water is closely contained. But snow-water, or any water long boiled over the fire, affords an ice more solid, and with fewer bubbles. Pure water long kept in vacuo and frozen afterwards there, freezes much sooner, on being exposed to the same degree of cold, than water unpurged of its air and set in the open atmosphere. And the ice made of water thus divested of its air is much harder, more solid and transparent, and heavier than common ice.

Ice-Hills.

ICE-HILLS are a sort of structure or contrivance common upon the river Neva at Petersburg, and which afford a perpetual fund of amusement to the populace. They are constructed in the following manner: A scaffolding is raised upon the river about 30 feet in height, with a landing-place on the top, the ascent to which is by a ladder. From this summit a sloping plain of boards, about four yards broad and 30 long, descends to

the superficies of the river: it is supported by strong poles gradually decreasing in height, and its sides are defended by a parapet of planks. Upon these boards are laid square masses of ice, about four inches thick, which being first smoothed with the axe, and laid close to each other, are then sprinkled with water: by these means they coalesce, and, adhering to the boards, immediately form an inclined plain of pure ice. From the bottom of this plain the snow is cleared away for the length of 200 yards and the breadth of four, upon the level bed of the river; and the sides of this course, as well as the sides and top of the scaffolding, are ornamented with firs and pines.

Each person, being provided with a sledge, mounts the ladder; and having attained the summit, he seats himself upon his sledge at the upper extremity of the inclined plain, down which he suffers it to glide with considerable rapidity, poising it as he goes down; when the velocity acquired by the descent carries it above 100 yards upon the level ice of the river. At the end of this course, there is usually a similar ice-hill, nearly parallel to the former, which begins where the other ends; so that the person

immediately mounts again, and in the same manner glides down the other inclined plain of ice. This diversion he repeats as often as he pleases. The boys also are continually employed in skating down these hills: they glide chiefly upon one skate, as they are able to poise themselves better upon one leg than upon two. These ice-hills exhibit a pleasing appearance upon the river, as well from the trees with which they are ornamented, as from the moving objects which at particular times of the day are descending without intermission.

Icebergs.

ICEBERGS, are large bodies of ice filling the vallies between the high mountains in northern latitudes. Among the most remarkable are those of the east coast of Spitzbergen. They are seven in number, but at considerable distances from each other; each fills the vallies for tracts unknown, in a region totally inaccessible in the internal parts. The glaciers of Switzerland (see **GLACIERS**, p. 62,) seem contemptible to these; but present a similar front into some lower valley. The last exhibits over the sea a front 300 feet

high, emulating the emerald in colour: cataracts of melted snow precipitate down various parts, and black spiring mountains, streaked with white, bound the sides, and rise crag above crag, as far as eye can reach in the back ground. At times immense fragments break off, and tumble into the water with a most alarming dashing. In *Phipps's Voyage to the North Pole*, p. 70, we are told, a piece of this vivid green substance has fallen, and grounded in 24 fathoms water, and spired above the surface 50 feet. Similar icebergs are frequent in all the Arctic regions; and to their lapses is owing the solid mountainous ice which infests those seas.

Frost sports wonderfully with these icebergs, and gives them majestic as well as other most singular forms. Masses have been seen assuming the shape of a Gothic church, with arched windows and doors, and all the rich drapery of that style, composed of what an Arabian tale would scarcely dare to relate, of crystal of the richest sapphirine blue: tables with one or more feet; and often immense flat-roofed temples, like those of Luxor on the Nile, supported by round transparent columns of cœrulean hue, float by the astonished spectator.

These icebergs are the creation of ages, and receive annually additional height by the falling of snows and of rain, which often instantly freezes, and more than repairs the loss occasioned by the influence of the melting sun.

THOMSON has a magnificent description of these icy regions :

The Muse

Thence sweeps the howling margin of the main ;
 Where undissolving, from the first of time,
 Snows swell on snows amazing to the sky ;
 And icy mountains high on mountains piled,
 Seem to the shivering sailor from afar,
 Shapeless and white, an atmosphere of clouds.
 Projected huge, and horrid, o'er the surge,
 Alps frown on Alps ; or rushing hideous down,
 As if old Chaos was again returned,
 Wide rend the deep, and shake the solid pole.
 Ocean itself no longer can resist
 The binding fury ; but, in all its rage
 Of tempest taken by the boundless frost,
 Is many a fathom to the bottom chained,
 And bid to roar no more : a bleak expanse,
 Shagged o'er with wavy rocks, cheerless, and void
 Of every life, that from the dreary months
 Flies conscious southward. Miserable they !
 Who here entangled in the gathering ice,
 Take their last look of the descending sun ;
 While, full of death, and fierce with tenfold frost,
 The long, long night incumbent o'er their heads,
 Falls horrible. Such was the Briton's * fate,
 As with *first* prow (what have not Britons dared !)

* Sir Hugh Willoughby, sent by Queen Elizabeth, to discover the north-east passage.

He for the passage sought, attempted since
 So much in vain, and seeming to be shut
 By jealous Nature with eternal bars.
 In these fell regions, in Arzina caught,
 And to the stony deep his idle ship
 Immediate sealed, he with his hapless crew,
 Each full exerted at his several task,
 Froze into statues; to the cordage glued
 The sailor, and the pilot to the helm.

Ice Islands.

THESE are composed of a great quantity of ice collected into one huge solid mass, and floating about upon the seas near or within the Polar circles. Many of these fluctuating islands are met with on the coasts of Spitzbergen, to the great danger of the shipping employed in the Greenland fishery. In the midst of those tremendous masses navigators have been arrested and frozen to death. In this manner the brave Sir Hugh Wil-
 loughby perished with all his crew, in 1553; and in the year 1773, Lord Mulgrave, after every effort which the most finished seaman could make to accomplish the end of his voyage, was caught in the ice, and was near experiencing the same unhappy fate. See the account at large in *Phipps's Voyage to the North Pole*. As there described, the scene, di-

vested of the horror from the eventful expectation of change, was the most beautiful and picturesque.

Two large ships becalmed in a vast bason, surrounded on all sides by islands of various forms: the weather clear; the sun gilding the circumambient ice, which was low, smooth, and even; covered with snow, excepting where the pools of water on part of the surface appeared crystalline with the young ice: the small space of sea they were confined in, perfectly smooth. After fruitless attempts to force a way through the fields of ice, their limits were perpetually contracted by its closing; till at length it beset each vessel till they became immoveably fixed. The smooth extent of surface was soon lost: the pressure of the pieces of ice, by the violence of the swell, caused them to pack; fragment rose upon fragment, till they were in many places higher than the main-yard. The movements of the ships were tremendous and involuntary, in conjunction with the surrounding ice, actuated by the currents. The water shoaled to 14 fathoms. The grounding of the ice or of the ships would have been equally fatal: the force of the ice might have crushed them to atoms, or have lifted them out of the water and

overset them, or have left them suspended on the summits of the pieces of ice at a tremendous height, exposed to the fury of the winds, or to the risk of being dashed to pieces by the failure of their frozen dock.

An attempt was made to cut a passage through the ice; after a perseverance worthy of Britons it proved fruitless. The commander, at all times master of himself, directed the boats to be made ready to be hauled over the ice, till they arrived at navigable water (a task alone of seven days), and in them to make their voyage to England. The boats were drawn progressively three whole days. At length a wind sprung up, the ice separated sufficiently to yield to the pressure of the full-sailed ships, which, after labouring against the resisting fields of ice, arrived on the 10th of August in the harbour of Smeeringberg, at the west end of Spitzbergen, between it and Hackluyt's Headland.

Blink of the Ice.

THE forms assumed by the ice in this chilling climate, are extremely pleasing to even the most incurious eye. The

surface of that which is congealed from the sea-water (for we must allow it two origins) is flat and even, hard, opaque, resembling white sugar, and incapable of being slid on like the British ice. The greater pieces, or fields, are many leagues in length: the lesser are the meadows of the seals, on which those animals at times frolick by hundreds. The motion of the lesser pieces is as rapid as the currents: the greater, which are sometimes 200 leagues long, and 60 or 80 broad, move slowly and majestically; often fix for a time, immoveable by the power of the ocean, and then produce near the horizon that bright white appearance called the *blink*. The approximation of two great fields produces a most singular phenomenon; it forces the lesser (if the term can be applied to pieces of several acres square) out of the water, and adds them to their surface: a second, and often a third succeeds; so that the whole forms an aggregate of a tremendous height. These float in the sea like so many rugged mountains, and are sometimes 500 or 600 yards thick; but the far greater part is concealed beneath the water. These are continually increased in height by the freezing of the spray of the sea, or of the meltings of the snow,

which falls on them. Those which remain in this frozen climate receive continual growth; others are gradually wafted by the northern winds into southern latitudes, and melt by degrees by the heat of the sun, till they waste away, or disappear in the boundless element.

The collision of the great fields of ice, in high latitudes; is often attended with a noise that for a time takes away the sense of hearing any thing else; and the lesser with a grinding of unspeakable horror. The water which dashes against the mountainous ice freezes into an infinite variety of forms; and gives the voyager ideal towns, streets, churches, steeples, and every shape which imagination can frame.

Union of Sugar and Ice by the Agency of Fire.

IN the winter of 1799, (says M. Acerbi) I beheld at Stockholm a spectacle of a very uncommon nature, and such as I never, in all probability, shall see a second time. It was a sugar-house on fire in the suburb, on the south of the city. The accident being announced by the discharge of cannon, all the fire en-

gines were immediately hurried to the aid of the owners. The severity of that winter was so great, that there was not a single spot near, where the water was not frozen to the depth of a yard from the surface. It was necessary to break the ice with hatchets and hammers, and to draw up the water as from a well. Immediately on filling the casks, they were obliged to carry them off with all possible speed, lest the water should be congealed, as in fact about a third-part of it was by the time it could be brought to the place where it was wanted. In order to prevent it as much as possible from freezing, they constantly kept stirring it about with a stick ; but even this operation had only a partial effect. At last, by the united power of many engines, which launched forth a great mass of water, the fire was got under, after destroying only the roof, the house itself being very little damaged.

It was in the upper stories of the building that the stock of sugar was deposited ; there were also many vessels full of treacle, which being broken by the falling-in of the roof, the juice ran down along the sides of the walls. The water thrown up to the top of the house by the engines, and flowing back on the

walls, staircases, and through the windows, was stopped in its downward course by the mighty power of the frost. After the fire was extinguished, the engines continued for some time to play, and the water they discharged was frozen almost the instant it came in contact with the walls already covered with ice. Thus a house was formed of the most extraordinary appearance that it is possible to conceive. It was so curious an object that every body came to gaze at it as a something wonderful. The whole building, from top to bottom, was incrustated with a thick coat of ice: the doors and windows were closed up, and in order to gain admission it was necessary with hammers and hatchets to open a passage; they were obliged to cut through the ice another staircase, for the purpose of ascending to the upper stories.

All the rooms, and what remained of the roof, were embellished by long stalactites of multifarious shapes, and of a yellowish colour, composed of the treacle and congealed water. This building, contemplated in the light of the sun, seemed to bear some analogy to those diamond castles that are raised by the imaginations of poets. It remained upwards of two months in the same state,

and was visited by all the curious. The children in particular had excellent amusement with it, and contributed not a little to the destruction of the enchanted palace, by searching for the particles of sugar, which were found in many places incorporated with the ice.

Glaciers.

IF any person (says Mr. Coxe) could be conveyed to such an elevation as to embrace at one view the Alps of Switzerland, Savoy, and Dauphiny, he would behold a vast chain of mountains, intersected by numerous vallies, and composed of many parallel chains, the highest occupying the centre, and the others gradually diminishing in proportion to their distance from that centre. The most elevated or central chain would appear bristled with pointed rocks, and covered, even in summer, with ice and snow in all parts that are not absolutely perpendicular. On each side of this chain he would discover deep vallies clothed with verdure, peopled with numerous villages, and watered by many rivers. In considering these objects with greater attention, he would remark that the central chain is composed of elevated peaks

and diverging ridges, whose summits are overspread with snow; that the declivities of the peaks and ridges, excepting those parts that are extremely steep, are covered with snow and ice; and that the intermediate depths and spaces between them are filled with immense fields of ice, terminating in those cultivated valleys which border the great chain. The branches most contiguous to the central chain would present the same phenomena, only in a less degree.

At greater distances no ice would be observed, and scarcely any snow, but upon some of the most elevated summits; and the mountains, diminishing in height and ruggedness, would appear covered with herbage, and gradually sink into hills and plains. In this general survey the Glaciers may be divided into two sorts: the first occupying the deep valleys situated in the bosom of the Alps, and termed by the natives Valley of Ice, but which I shall distinguish by the name of Lower Glaciers; the second, which close the summits and sides of the mountains, I shall call Upper Glaciers.

1. *The Lower Glaciers* are by far the most considerable in extent and depth. Some stretch several leagues in length: that of des Bois, in particular, is more

than fifteen miles long, and above three in its greatest breadth. The Lower Glaciers do not, as is generally imagined, communicate with each other, and but few of them are parallel to the central chain: they mostly stretch in a transverse direction, are bordered at the higher extremity by inaccessible rocks, and on the other extend into the cultivated valleys. The thickness of the ice varies in different parts. M. de Saussure found its general depth in the glacier des Bois from eighty to a hundred feet, but questions not the information of those who assert that in some places its thickness exceed even six hundred feet.

These immense fields of ice usually rest on an inclined plain. Being pushed forward by pressure of their own weight, and but weakly supported by the rugged rocks beneath, they are intersected by large transverse chasms, and present the appearance of walls, pyramids, and other fantastic shapes, observed at all heights, and in all situations, wherever the declivity exceeds thirty or forty degrees. But in those parts where the plain on which they rest is horizontal, or only gently inclined, the surface of the ice is nearly uniform; the chasms are but few and narrow, and the traveller

crosses on foot without much difficulty. The surface of the ice is not so slippery as that of frozen ponds or rivers: it is rough and granulated, and is only dangerous to the passenger in deep descents. It is not transparent, is extremely porous and full of small bubbles, which seldom exceed the size of a pea, and consequently is not so compact as common ice: its perfect resemblance to the congelation of snow impregnated with water, and its opacity, roughness, and in the number and smallness of the air-bubbles, led M. de Saussure to conceive the following simple and natural theory on the formation of the Glaciers.

An immense quantity of snow is continually accumulating in the elevated valleys which are inclosed within the Alps, as well from that which falls from the clouds during nine months in the year, as from the masses which are incessantly rolling from the steep sides of the circumjacent mountains. Part of this snow which is not dissolved during summer, impregnated with rain and snow-water, is frozen during winter, and forms that opaque and porous ice of which the Lower Glaciers are composed. 2. *The Upper Glaciers* may be subdivided into those which cover the summits, and

those which extend along the sides of the Alps. Those which cover the summits of the Alps owe their origin to the snow that falls at all seasons of the year, and which remains nearly in its original state, being congealed into a hard substance, and not converted into ice. For although, according to the opinion of some philosophers, the summit of Mont Blanc and of other elevated mountains is, from the glistening of the surface, supposed to be covered with pure ice, yet it appears, both from theory and experience, that it is not ice but snow. For in so elevated and cold a region there cannot be melted a quantity of snow sufficient to impregnate with water the whole mass which remains undissolved. Experience also justifies this reasoning.

M. de Saussure found the top of Mont Blanc only encrusted with ice, which, though of a firm consistence, was yet penetrable with a stick; and on the declivities of the summit he discovered beneath the surface a soft snow without coherence. The substance which clothes the sides of the Alps is neither pure snow like that of the summits, nor ice which forms the Lower Glaciers, but is an assemblage of both. It contains less snow than the summits, because the summer

heat has more power to dissolve it, and because, the liquefied snow descending from above, the mass is penetrated with a larger quantity of water. It contains more snow than the Lower Glaciers, because the dissolution of the snow is comparatively less. Hence the ice is even more porous, opaque, and less compact than the ice of the Lower Glaciers, and is of so doubtful a texture as renders it in many parts difficult to decide, whether it may be called ice or frozen snow. In a word, there is a regular gradation from the snow on the summits to the ice of the Lower Glaciers, formed by the intermediate mixture of snow and ice, which becomes more compact and less porous, in proportion as it approaches the Lower Glaciers, until it unites and assimilates with them. And it is evident, that the greater or lesser degree of density is derived from the greater or lesser quantity of water with which the mass is impregnated.

An Icy Epitaph.

A curious record of an accident, occasioned by the downfall of ice, is to be found as an epitaph, on the son of the then parish clerk, at Bampton, in Devon-

shire, who was killed by an icicle falling upon, and fracturing his skull.

In memory of the Clerk's Son.

Bless my i, i, i, i, i, i,
 Here I lies
 In a sad Pickle
 Kill'd by *Icicle*.

In the Year of *Anno Domini*, 1776.

How to make Ice.

IN many countries, the warmth of the climate renders ice not only a desirable, but even a necessary article: hence it becomes an object of some importance to procure it in a cheap and easy manner.— For this purpose, in the East Indies, three or four pits are dug on a large open plain, each of which is about thirty feet square, and two feet deep; the bottoms are covered to the depth of eight or ten inches with dried straw, or the stems of sugar-canes. On this bed are arranged, in rows, a number of unglazed pans made of porous earth, about a quarter of an inch thick, and an inch and a quarter deep, which are filled about sun-set, with water that has been boiled and become

cool.—Early in the morning, a coat of ice is found on the pans, which is broken by striking an iron hook into its centre, and then conveyed in baskets to the place of preservation.

The most expeditious method, however, of producing ice, consists in a combination of *sal ammoniac* with *nitre*. It was first discovered by BOERHAAVE, whose experiments were repeated and confirmed by Mr. WALKER, apothecary to the Radcliffe Infirmary, Oxford; but he found that his thermometer sunk 32° in a solution of *sal ammoniac*, when BOERHAAVE's fell only 28° : *nitre* alone reduced it to 19° . On mixing the two salts, in equal proportions, the power of generating cold was considerably increased; so that the water was cooled to 22° , while the thermometer stood at 47° in the open air. By adding some powder of the same composition, and immersing in the mixture two small phials filled with water, he found it in a short time frozen.

Having observed that *Glauber's salt*, when it retains the water of crystallization, produces cold in a state of solution, Mr. WALKER made an experiment of its effects when mixed with the other salts before mentioned; in consequence of

which the thermometer sunk from 69° to 19°, and he obtained ice, while the thermometer stood as high as 70°.—Lastly, by previously immersing the salts in the water of one mixture, and then making another of the cooled materials, he was able to sink the mercury in the thermometer to 64°. Thus, he froze a mixture of spirit of wine and water, in the proportion of seven of the latter to one of the former; and, by adding a quantity of the cooled materials to the mixture in which this was frozen, the quicksilver fell to the extraordinary depth of 69 degrees.

Various other methods of procuring artificial ice have been contrived, particularly by the aid of æther; but that volatile spirit is too expensive for domestic purposes, and a satisfactory account of the process would exceed our limits.

How to make Ice Cream.

ICE CREAM is prepared by mixing three parts of cream with one part of the juice or jam of raspberries, currants, &c. The mixture is then well beaten; and, after being strained through a cloth, is poured into a pewter mould or vessel, adding a small quantity of lemon-juice. The

mould is now covered, and plunged in a pail about two thirds full of ice, into which two handfuls of salt should be previously scattered. The vessel containing the cream is then briskly agitated for eight or ten minutes, after which it is suffered to stand for a similar space of time ; the agitation is then repeated, and the cream allowed to subside for half an hour, when it is taken out of the mould, and sent to table.

A Palace built of Ice.

IN the year 1740, the Empress Anne of Russia, caused a palace of ice, to be erected upon the banks of Neva. This extraordinary edifice, was fifty-two feet in length, sixteen in breadth, and twenty feet high, and constructed of large pieces of ice cut in the manner of freestone. The walls were three feet thick. The several apartments were furnished with tables, chairs, beds, and all kinds of household furniture of ice. In front of this edifice, besides pyramids and statues, stood six cannon, carrying balls of six pounds weight, and two mortars, entirely made of ice. As a trial from one of the former, an iron ball, with only a

quarter of a pound of powder, was fired off, the ball of which went through a two-inch board, at sixty paces from the mouth of the piece, which remained completely uninjured by the explosion. The illumination in this palace, at night, was astonishingly grand.

Hamburgh Ice-Boat.

THE body of this boat consists of wicker-work covered with leather, to render it impermeable by water; and is remarkably light, that it may be easily managed by one person, both on the ice and in the water. Its length, measured on the outside, is seven and a half feet in the keel, and twelve feet above from end to end: its breadth, three feet at the bottom, and four at the upper part.

The bottom of the boat is shod with two small pieces of iron: and by means of two hooks, the boat may, with the greatest facility be slid over the ice. In the lower part or body of the vessel, there is a large opening, three feet long and fifteen inches wide, the four sides of which are secured by a frame-work, to prevent the water from entering the vessel. Through this opening, also, the

boatman is enabled to step upon the ice in those places where it is too uneven to admit the sliding of the boat, and to carry it, by means of handles.

Another advantage derived from this aperture, in the middle of the boat, is the counterpoise which a column of water in its centre produces, and thus prevents it from being overset, while the man who carried it over the ice, immediately raises himself above the level of the water, and sits down in the vessel.

But, in order to approach nearer to the person whose life is endangered, there is also employed a ladder with a long jointed handle, which is pushed forward and held by another assistant standing on the firm ice. On this ladder the boatman places himself, and advances as near as possible to the body immersed in the water. Having successfully extracted it, no time should be lost in laying it in a proper posture in the boat; for which purpose there is a kind of chair with an elevated back, on the stern of the boat.

M. Gunther, one of the most active members of the **Hamburgh Society for the encouragement of the arts and useful**

trades, informs us in the third volume of their Transactions, published in 1795, that he has often been present when unfortunate persons have been rescued from untimely death, by means of the ice-boat, and that the swiftness and dexterity with which this machine may be managed by expert assistants, is almost incredible. Hence the vessel is not entrusted to any other but skilful hands, and during summer it is deposited in an airy place, and the leather preserved from becoming either too dry or mouldy. The whole of this useful apparatus costs only 150 marks currency, or about 10l. sterling; *a sum so insignificant, that while the city of Hamburgh has built five such ice-boats, the great city of London ought to be in possession of at least an hundred.*

*To render Assistance to Persons in
Danger of Drowning.*

THIS desirable object appears attainable by the proper use of a man's hat and pocket handkerchief, (which being all the apparatus necessary) is to be used thus: Spread the handkerchief on the ground, and place a hat, with the brim

downwards, on the middle of the handkerchief; and then tie the handkerchief round the hat as you would tie up a bundle, keeping the knots as near the centre of the crown as may be. Now, by seizing the knots in one hand, and keeping the opening of the hat upwards, a person, without knowing how to swim, may, fearlessly, plunge into the water with what may be necessary to save the life of a fellow-creature.

If a person should fall out of a boat, or the boat upset by going foul of a cable, &c. or should he fall off the quays, or indeed fall into any water from which he could not extricate himself, but must wait some little time for assistance had he presence of mind enough to whip off his hat, and hold it by the brim, placing his fingers within-side the crown, and hold it so, (top downwards) he would be able, by this method, to keep his mouth well above water till assistance should reach him. It often happens that danger is descried long before we are involved in the peril, and time enough to prepare the above method; and a courageous person would, in seven instances out of ten, apply to them with success; and travellers, in fording rivers at unknown fords, or where shallows are deceitful

might make use of these methods with advantage.

To recover Persons apparently drowned, as recommended by the HUMANE SOCIETY.

LET those who first discover an unfortunate object in this situation, remove it to some house near, place it by the fire, and begin by rubbing it with salt, volatiles, &c. and warm flannels, the head a little elevated; never attempting giving any thing by the mouth till signs of recovery strongly appear, and let the person be kept from the crowd of people around him.

The idea that the stomach is full of water, and thus obviates recovery, is very erroneous and prejudicial, as it is now fully and clearly established, that the respiration being impeded is the sole cause of the suspension of life, and which being restored, the vital functions soon recover their tone; and men are frequently lost from the absurd custom of rolling on casks, lifting the feet over the shoulders, and the head falling on the ground.

Construction of an Ice-House.

AN ICE-HOUSE, is a repository for the preservation of ice during the summer months.

The situation of an ice-house ought to be towards the south-east, on account of the advantage of the morning sun in expelling the damp air, which is far more prejudicial to it than warmth. The best soil on which such a house can be erected, is a chalk-hill, or declivity, as it will conduct the waste water, without the aid of any artificial drain; but where such land cannot be procured, a loose stony earth, or gravelly soil on a descent, is preferable to any other.

For the construction of an ice-house, a spot should be selected at a convenient distance from the dwelling-house. A cavity is then to be dug in the form of an inverted cone, the bottom being concave, so as to form a reservoir for the reception of waste water. Should the soil render it necessary to construct a drain, it will be advisable to extend it to a considerable length, or, at least, so far as to open at the side of the hill or declivity, or into a well. An air-trap should likewise be formed in the drain, by sinking the latter

so much lower in that opening as it is high, and by fixing a partition from the top, for the depth of an inch or two into the water of the drain, by which means the air will be completely excluded from the well. A sufficient number of brick-piers must now be formed in the sides of the ice-house, for the support of a cart-wheel, which should be laid with its convex side upwards, for the purpose of receiving the ice; and which ought to be covered with hurdles and straw, to afford a drain for the melted ice.

The sides and dome of the cone should be about nine inches thick, the former being constructed of *steened brick-work*, that is, without mortar, and with the bricks placed at right angles to the face of the work. The vacant space behind ought to be filled up with gravel, or loose stones, in order that the water oozing through the sides may the more easily be conducted into the well. The doors of the ice-house should likewise be so formed as to shut closely; and bundles of straw ought always to be placed before the inner door, for the more effectual exclusion of air.

The ice to be deposited in this building, should be collected during the frost; broken into small pieces; and properly

rammed down, in strata of about one foot thick, so that it may become one complete body :—in those seasons when sufficient quantities of ice cannot be procured, snow may be substituted, and preserved in a similar manner.

Morse-Catching on the Ice.

THE Russians who go out to catch the morse are hired for that purpose by a master or ship-owner, who not only furnishes them with the necessary vessels, but fits them out with provisions, stores, and whatever they are likely to want on the voyage, but either agrees to give them a share of what they take, or pays them certain wages. The latter, however, seldom exceed five or ten rubles for the summer; a trifling sum when we consider the hardships, toils, and dangers attending this profession. The morse-catchers usually take with them a year's provisions, as they are often obliged to pass the winter on board their ships. Every vessel has an oven for baking bread and cooking their victuals, for the supply of which they take the needful stock of wood. The only drink they carry out with them is water, with which

when they go on shore they prepare quas. —The time of departure varies according to circumstances; some set out at the beginning of summer, when the White-sea is free from ice, others not till autumn, especially if they intend to winter on the voyage. The greatest peril to which they are exposed at sea, is that of being hemmed in by the driving masses of ice; in this case, the ice by its force beats in the sides of the vessel, and the morse-catchers are then reduced to the dreadful alternative either of being buried in the waves on the spot, or of getting on the fields of ice floating at the mercy of the winds, till cold and hunger put an end to their sufferings. And yet it has happened, though very rarely, that some of these poor fellows have been brought alive to land on their flakes of ice.

When the morse-catchers are happily arrived at the place of their destination, the first thing they do is to conduct their vessels to some safe anchorage, where they generally find several little huts that have been constructed by their predecessors in this hazardous warfare, and then commit themselves to the small boats, of which every vessel takes with it one or two to proceed to the conflict with the

beasts of the ocean. This is usually done on the first fine day, because then the morses delight in going on the land, or on the ice, to repose; and besides, they are at times stimulated to leave their native element for a length of time for the purpose of copulation, which business lasts with these monsters for a month or two, or to cast their young, or to rescue themselves from the bites of the sea-lice, by which the morse in summer is perpetually tormented, and from which they have no other means of escaping than by fleeing into an element which deprives these insects of life. All these causes together collect them frequently on the beach, or fields of ice, in prodigious numbers. When the captors discover one of these multitudes, they must have the precaution to approach them against the wind, because these animals have so fine a smell, that they perceive the approach of men with the wind at a great distance, and then immediately take to the water; whereas in the contrary case they continue lying undisturbed, though they even see the boat advancing to them. Besides, the morse-catchers by this means have the advantage, discovering sooner the place where this prey has couched; for these

fat animals, especially in summer, emit far round them a horrid stench.

When the captors have reached this formidable encampment, they immediately quit their karbasses or boats, armed with nothing but their pikes, cut off the way to the sea from the morses, and then pierce those animals which come first to save themselves in the water. As it is the way with the morses to scramble over one another in their attempts to escape, from the numbers of the slain there soon arises a bulwark which effectually choakes up the passage to the living; and then the captors proceed with the slaughter till they have left not one alive. It sometimes happens that after such an engagement so great are the heaps of the dead, that the vessels can only contain the heads or the teeth; and the people are obliged to leave the fat, or blubber, and the skins behind.

But, easy as it is for the captors to conquer the morse by land, so dangerous is the conflict with these animals in their own element. We have only to recollect that the morse is commonly of the size of a large ox, and that, besides their sharp teeth, they are provided with two long stout tusks, for judging how a sea fight of this kind is likely to terminate. When

any of the morses escape into the water before they can all be killed, the captors leap upon the ice and fall upon the animals with harpoons, which they strive to strike into their breasts or their belly, and to each of which is fastened a long cord. This done, they drive a stake into the ice, wind the other end of the long harpoon-string round it, and are now drawn about, on the piece of ice on which they stand, by the animal till he has lost his strength, when they draw him upon the ice by the cord, and kill him outright.—But when the morses lie so near to the water, that they can leap in ere the attack begins, then the captors fasten the cord, when they have thrown the harpoon, only to the head of the boat, which is then drawn by the huge animal so deep into the water that the sailors must all run immediately astern. The morse having fruitlessly endeavoured to get loose from the cord, rises erect upon the surface of the water and makes a furious attack on his persecutors. In this he is sometimes so successful as to shatter the boat with his tusks, or to throw himself suddenly by a proportionate leap into the midships. Then nothing is left to the crew but to jump overboard and to hold by the gunnel, till

other morse-hunters come to their assistance in this desperate situation.—To mitigate the danger of these misfortunes, the captors not only previously take all proper measures, but it is even laid down by laws and regulations what conduct every one is to observe during the voyage and in the actual encounter with the morses. Each of these companies consists generally of a master or pilot, two harpooners, two barrelling people, a steersman, and several rowers, each of whom has his appointed duty.

CHAPTER IV.

Cold.

The Sun

Had first his precept so to move, so shine
 As might affect the earth with COLD and heat
 Scarce tolerable, and from the north call
 DECREPIT WINTER; from the south to bring
 Solstitial summer's heat. MILTON.

Heat and COLD are *Nature's two hands*, whereby she
 chiefly worketh. BACON.

Natural History of Cold.

THE properties of *cold* seem to be directly opposite to those of *heat*: the latter increases the bulk of all bodies; the former contracts them; and, while fire tends to dissipate their substance, cold condenses them, and strengthens their mutual cohesion. But, though cold thus appears, by some of its effects, to be nothing more than the absence or privation of heat, as darkness is only the defect of light, yet cold is probably possessed of another quality, which has induced many to consider it as a substance of a peculiar nature.

It is well known, that when a continuance of cold has contracted and condensed bodies to a certain degree, if then its power be increased, instead of progressively lessening their bulk, it enlarges and expands them, so that extreme cold, like heat, swells the substance into which it enters. Thus fluids sensibly contract in a cold temperature, till the moment they begin to freeze, when they immediately dilate, and occupy more space than they possessed while in a state of fluidity. Hence, liquor frozen to ice in a close cask, is often known to burst the vessel: when ice is broke on a pond, it swims upon the surface; a certain proof of its being lighter, or of a larger bulk, than an equal quantity of water.

This dilatation of fluids, however, is probably owing to a cause very different from that of excessive cold alone; because the power of freezing may be artificially increased, while the intensity of the cold receives no considerable addition; and, on the contrary, a substance capable of melting ice, will increase the degree of its coldness. Thus, for instance, sal ammoniac mixed with pounded ice, or snow, melts either of them into water; and increases their cold

to a surprising degree, as is obvious from the effects of this mixture, in sinking the thermometer. Hence the freezing of fluids cannot be entirely considered as the result of cold, but of some unknown property either in the air or water, which thus mixes with the body, and for a time destroys its fluidity.

Effects of Cold on the Human Frame.

Its immediate effects on the human body are, contraction of the cutaneous pores, and a temporary obstruction of insensible perspiration. Hence we perceive what is vulgarly called the "goose skin," and the parts thus affected will not recover their usual elasticity, till the spasm be removed, either by external or internal heat, or by friction, which excites the latter.

Beneficent Nature has enabled our frail and complicated frame, to support the heat and cold of different climates, with equal facility; and though man has devised artificial means of defending his body against the action of cold, or more properly, of retaining the *inbred*, or vital heat, yet it often happens that, by exposure to extreme cold, the fingers, ears,

toes, &c. are *frozen*: thus, the natural heat of those parts is reduced to the lowest point consistent with life. If, in such cases, artificial heat be too suddenly applied, a mortification will ensue, and the *frost-bitten* parts spontaneously separate. Hence they ought to be thawed, either by rubbing them with snow, or immersing them in cold water, and afterwards applying warmth in the most careful and gradual manner; by which they will soon be restored to their usual tone and activity.

Effect of Cold on Vegetation.

ALTHOUGH excessive heat is seldom very injurious to vegetation in this country, yet the defect of that element, or in common language, excess of cold, is frequently destructive to the tender shoots of the ash, and the early blossoms of many fruit-trees, such as apples, pears, apricots, &c.—The *blights* occasioned by frost, generally happen in the spring, when warm sunny days are succeeded by cold nights, as the living power of the plant has then been previously exhausted by the stimulous of heat, and is therefore less capable of being excited into the ac-

tions necessary to vegetable life, by the greatly diminished stimulus of a freezing atmosphere.

In the northern climate of Sweden and Russia, where long sunny days succeed the melting of copious snows, the gardeners are obliged to shelter their wall-trees from the meridian sun, in the vernal months; an useful precaution, which preserves them from the violent effects of cold in the succeeding night; and, by preventing them from flowering too early, avoids the danger of the vernal frosts. In a similar manner, the destruction of the more succulent parts of vegetables, such as their early shoots, especially when exposed to frosty nights, can only be counteracted by covering them from the descending dews, or rime, by the coping-stones of a wall, or mats of straw.

Singular Effect of Cold in Lapland.

THE effects of these extreme degrees of cold are very surprising. Trees are burst, rocks rent, and rivers and lakes frozen several feet deep: metallic substances blister the skin like red hot iron: the air, when drawn in by breathing, hurts the lungs, and excites a cough; even the ef-

fects of fire in a great measure seem to cease; and it is observed, that, though metals are kept for a considerable time before a strong fire, they will still freeze water when thrown upon them. When the French mathematicians wintered at Tornea in Lapland, the external air, when suddenly admitted into their rooms, converted the moisture of the air into whirs of snow; their breasts seemed to be rent when they breathed it, and the contact of it was intolerable to their bodies; and the spirit of wine, which had not been highly rectified, burst some of their thermometers by the congelation of the aqueous part.

Extreme Cold of Siberia.

“ HERE, says Mr. Gmelin, “ we first experienced the truth of what various travellers have related with respect to the extreme cold of Siberia; for, about the middle of December, such severe weather set in, as we were sure had never been known in our time at Petersburg. The air seemed as if it were frozen, with the appearance of a fog, which did not suffer the smoke to ascend as it issued from the chimnies. Birds fell down out

of the air as dead, and froze immediately, unless they were brought into a warm room. Whenever the door was opened, a fog suddenly formed round it. During the day, short as it was, parhelia and haloes round the sun were frequently seen; and in the night mock moons, and haloes about the moon. Finally, our thermometer, not subject to the same deception as the senses, left us no doubt of the excessive cold; for the quicksilver in it was reduced, on the 5th of January, old style, to—120° of Fahrenheit's scale, lower than it had ever been observed in nature."

*Curious Effect of Cold on the Feathered
Tribe.*

IN February, 1809, a boy in the service of Mr. W. Newman, miller, at Leybourne, near Malling, went into a field, called the Forty Acres, and saw a number of Rooks on the ground, very close together. He made a noise to drive them away, but they did not appear alarmed; he threw snow-balls to make them rise, still they remained. Surprised at this apparent indifference, he went in among them, and actually picked up twenty-

seven Rooks ; and also in several parts of the same field, ninety Larks, a Pheasant, and a Buzzard Hawk. The cause of the inactivity of the birds, was a thing of rare occurrence in this climate; a heavy rain fell on the Thursday afternoon, which, freezing as it came down, so completely glazed over the bodies of the birds, that they were fettered in a coat of ice, and completely deprived of the power of motion. Several of the Larks were dead, having perished from the intensesness of the cold. The Buzzard Hawk being strong, struggled hard for his liberty, broke his icy fetters, and effected his escape.

Miscellaneous Effects of Cold in foreign Countries, in former times.

THE effect of severe cold in other countries, and former times, is thus mentioned by Martin du Bellay, who, affirms, that, in Luxembourg journey, the frost was so sharp, that the ammunition wine, was cut with hatchets, and wedges, and delivered out to the soldiers, by weight, and that they took it away in baskets. Philip de Comines, speaking of the cold, in the principality

of Liege, Anno 1769, says, that the wine was dug out from the pipes, cut in wedges, and so carried off by gentlemen in hats or baskets. At the mouth of the Lake Mæotis, the frosts are so keen, that on the same spot, where the Lieutenant of Mithridates had fought the enemy dry-foot, and given them a defeat, the summer following, he also obtained over them, a naval victory.

The distress in the retreat of the allied armies from Moscow, can be imagined, if the comparison be made of the miseries the Greeks endured, in retiring from Babylon to their own country. One of which, was, that being encountered in the mountains of Armenia with a storm of snow, they lost all knowledge of the roads, and were a day and night, without eating or drinking, most of their cattle died, many of themselves were starved, several struck blind, with the driving of the hail, and the glitter of the snow. Numbers were maimed in their fingers and toes, and also became motionless with the intense cold, although their understanding was not impaired. The allied forces had a much longer duration of similar calamities to sustain and overcome.

CHAPTER V.

Northern Winters.

There WINTER armed with terrors here unknown
 Sits absolute on his unshaken throne ;
 Piles up his stores amid the frozen waste,
 And bids the mountains he has built stand fast ;
 Beckons the legions of his storms away
 From happier scenes to make the land a prey ;
 Proclaims the soil a conquest he has won,
 And scorns to share it with the distant sun.

COWPER.

BEFORE we describe the severity of foreign climes, we cannot do better than quote the following passage of the great JOHNSON, which we recommend to the serious attention of our readers. ‘ A native of England, pinched with the frost of December, may lessen his affection for his own country, by suffering his imagination to wander in the vales of Asia, and sport among woods that are always green, and streams that always murmur ; but, if he turns his thoughts towards the polar regions, and considers the nations to whom a great portion of the year is darkness, and who are condemned to pass weeks and months amid mountains

of snow, he will soon recover his tranquillity; and, while he stirs his fire, or throws his cloak about him, reflect how much he owes to Providence, that he is not placed in Greenland or Siberia.'

A Winter in Stockholm.

THE snow that begins to fall in the latter weeks of autumn covers and hides the streets for the space of six months; and renders them more pleasant and convenient than they are in summer or autumn; at which seasons, partly on account of the pavement, and partly on account of the dirt, they are often almost impassable. One layer of snow on another, hardened by the frost, forms a surface more equal and agreeable to walk on, which is sometimes raised more than a yard above the stones of the street. You are no longer stunned by the irksome noise of carriage-wheels; but this is exchanged for the tinkling of little bells, with which they deck their horses before the sledges. The only wheels now to be seen in Stockholm (says Acerbi) are those of small carts, employed by men-servants of families to fetch water from the pump in a cask.

This compound of cart and cask always struck me as a very curious and extraordinary object; insomuch that I have taken the trouble of following it, in order to have a nearer view of the whimsical robe in which the frost had invested it, and particularly of the variegated and fantastical drapery in which the wheels were covered and adorned. This vehicle, with all its appurtenances, afforded to a native of Italy a very singular spectacle. The horse was wrapped up, as it seemed, in a mantle of white down, which under his breast and belly were fringed with points and tufts of ice. Stalactical ornaments of the same kind, some of them to the length of a foot, were also attached to his nose and mouth. The servant that attended the cart had on a frock, which was encrusted with a solid mass of ice. His eye-brows and hair jingled with icicles, which were formed by the action of the frost on his breath and perspiration. Sometimes the water in the pump was frozen, so that it became necessary to melt it by the injection of a red-hot bar of iron.

Neither men nor women carry any thing on their heads or shoulders, but employ small sledges, which they push on before them. When they come to a

declivity, they rest with their left hip and thigh on the sledge, and glide down to the bottom with a velocity, which to a stranger appear both astonishing and frightful, guiding all the while the motion of the sledge with their right foot. The address with which they perform this, it is not easy for any one to conceive who has not witnessed it. If you add to the objects which I have been describing, the curious appearance of the many different pelisses that are worn with the furs on the outside, you will imagine what a striking scene the streets of Stockholm in winter present to a foreigner, especially to one that came from the southern part of Europe.

Preparations for Winter in Russia.

On the approach of winter the double windows are put up in all the houses, having the joints and interstices caulked and neatly pasted with the border of the paper with which the room is hung. This precaution not only protects against cold and wind, but secures a free prospect even in the depth of winter, as the panes of glass are thus never incrustated with ice. The outer doors, and frequently

the floors under the carpets, are covered with felt. Our stoves, which from their size and construction, consume indeed a great quantity of wood, produce a temperature in the most spacious apartments and public halls, which annihilates all thoughts of winter.

On leaving the room we arm ourselves still more seriously against the severity of the cold. Caps, furs, boots lined with flannel, and a muff, make up the winter dress. It is diverting to see the colossal cases in the antichamber, out of which in a few minutes the most elegant beaux are unfolded. The common Russian cares only about warm wrappers for his legs and feet. Provided with a plain sheep-skin shube, the drivers and itinerant tradesmen frequent the streets all day, with their bare necks and frozen beards. In a frost of five and twenty degrees it is common to see women standing for hours together rining their linen through holes in the ice of the canals.

The winter increases the necessaries of life, and they are multiplied by luxury. To these belong the winter cloathing, fuel and candles. That people here run into great expences in the article of furs may be well imagined; and the fashion varies so often that a man must be in

more than moderate circumstances to be able to follow it. The consumption of wood is enormous. In the kitchens, bagnios, and servants'-rooms, which are heated like bagnios, there is an incredible waste of this prime necessary of life in our climates. Upon a moderate computation here are annually consumed upwards of two hundred thousand fathoms, amounting in specie to about half a million of rubles. This formidable consumption and the rising price of wood, are highly deserving of patriotic attention. The expence in tallow and wax candles is proportionately large. Throughout the long winter we live in an almost everlasting night, as our shortest day is only five hours and a half. In houses conducted on a fashionable style the wax-candles, as in England, are lighted long before dinner.

Virgil's Description of a Scythian Winter.

Early they stall their flocks and herds ; for there
 No grass the fields, no leaves the forests wear :
 The frozen earth lies bury'd there, below
 A hilly heap, sev'n cubits deep in snow ;
 And all the west allies of stormy Boreas blow. }
 The Sun, from far, peeps with a sickly face ;
 Too weak the clouds, and mighty fogs to chace ;
 When up the skies he shoots his rosy head,
 Or in the ruddy ocean seeks his bed.

Swift rivers are with sudden ice constrain'd ;
 And studded wheels are on its back sustain'd.
 An hostry now for waggons, which before
 Tall ships of burden on its bosom bore.
 The brazen cauldrons with the frost are flaw'd ;
 The garment, stiff with ice, at hearths is thaw'd ;
 With axes first they cleave the wine, and thence,
 By weight, the solid portions they dispense.
 From locks, uncomb'd, and from the frozen beard,
 Long isicles depend, and crackling sounds are heard.
 Mean'time, perpetual sleet, and driving snow
 Obscure the skies, and hang on herds below :
 The starving cattle perish in their stalls,
 Huge oxen stand inclos'd in wintry walls
 Of snow congeal'd ; whole herds are buried there
 Of mighty stags, and scarce their horns appear ;
 The dext'rous huntsman wounds not there a-far,
 With shafts or darts, or makes a distant war
 With dogs ; or pitches toils to stop their flight ;
 But close engages in unequal fight.
 And while they strive, in vain, to make their way
 Through hills of snow, and pitifully bray ;
 Assaults, with dint of sword, or pointed spears,
 And homeward, on his back, the joyful burden bears.
 The men to subterranean caves retire ;
 Secure from cold, and crowd the cheeful fire :
 With trunks of elms and oaks, the hearth they load,
 Nor tempt th' inclemency of Heav'n abroad ;
 Their jovial nights in frolic and in play
 They pass, to drive the tedious hours away,
 And their cold stomachs with crown'd goblets cheer,
 Of windy cyder, and of barmy beer.
 Such are the cold Raphëan race ; and such
 The savage Scythian, and the German Dutch ;
 Where skins of beasts the rude barbarians wear,
 The spoils of foxes and the furry bear.

*Curious Description of a Russian Winter
in 1603.*

THE countrey differeth very much from it selfe by reason of the yeare, so that a man woulde maruell to see the greate alteration and difference betwixte the winter and summer in Russia. The whole countrey in winter lyeth vnder snowe (which falleth continually) and is sometime of a yarde or twoe thicke, but greater towards the north. The riuers and other waters are frozen vppe a yearde or more thicke, howe swifte or broade soeuer they bee. And this continueth commonly fise monethes, viz. from the beginning of November, till towards the ende of March, aboute which time the snowe beginneth to melte. The sharpnesse whereof, you may iudge of by this: for that water dropped downe or caste vppe into the aire, congealeth into yce before it come to the grounde.

In the extremity of winter, if you holde a pewter dish or pot in your hand, or any other mettall (excepte in some chamber where their warme stoness be) your fingers wil friez fast vnto it, & draw off the skin at the parting: when you passe out of a warme roome into a colde, you shall senceibly feele your breathe to waxe

starcke, and euen stifling with the colde as you draw it in and out.

Diuers not onely that trauell abroad, but in the very markettes & streetes of their townes, are monstrously pinched & killed withall; so that you shall see many droppe downe in the streetes, many traellers brought into the townes sitting deade & stiffe in their sleds; & yet in summer time you shall see such a new heiw & face of a countrie, the woods so fresh and so sweet, the pastures and meadwes so Greene and well growne (and that upon the suddaid) such variety of flowers, such meelody of birdes (especially of nightingales) that a man shall not lightly truail in a more pleasanter countrey; which fresh and speedy growth of the spring seemeth to proceede from the benefit of the snowe, which all the winter time being spred ouer the whole countrey as a white rose, and keeping it warme from the rigor of the frost, in the spring time, when the weather waxeth warme, and the sunne dissolueth it into water, doeth so thoroughly drench and soake the ground, being of a sleight and sandy mould, and then shineth so hotly vpon it againe, that it euen forceth the hearbes and plants forth in great plenty and variety, and that in a shorte time. As the

winter season in these regions exceedeth in cold, so likewise I may say that the summer inclineth to ouermuch heat, especially in the moneth of Iune, Iuly and August, beeing accounted the three chefest moneths of burning heat, and yet in these places it is much warmer then the summer in England."

*Beautiful Description of a Winter at
Copenhagen.*

[In a Letter from A. Philips to the Earl of Dorset.]

From frozen climes, and endless tracks of snow,
From streams which northern winds forbids to flow,
What present shall the Muse to Dorset bring,
Or how so near the pole attempt to sing?
The hoary winter here conceals from sight
All pleasing objects which to verse invite:
The hills and dales, and the delightful woods,
The flow'ry plains and silver-streaming floods,
By snow disguis'd in bright confusion lie,
And with one dazzling waste fatigue the eye.

No gentle-breathing breeze prepares the spring,
No birds within the desert region sing.
The slips unnov'd, the boist'rous winds defy,
While rattling chariots o'er the ocean fly.
The vast Leviathan wants room to play
And spent his waters in the face of day.
The starving wolves along the main sea prowl,
And to the moon in icy vallies howl,
O'er many a shining league the level main
Here spreads itself into a glassy plain;
There solid billows of enormous size,
Alps of green ice, in wild disorder rise.

And yet but lately have I seen ev'n here
 The winter in a lovely dress appear.
 Ere yet the clouds let fall the treasur'd snow,
 Or winds begun thro' hazy skies to blow,
 At ev'ning a keen eastern breeze arose,
 And the descending rain unsully'd froze.
 Soon as the silent shades of night withdrew,
 The ruddy Morn disclos'd at once to view
 The face of Nature in a rich disguise,
 And brighten'd ev'ry object to my eyes,
 For ev'ry shrub and ev'ry blade of grass,
 And ev'ry pointed thorn, seem'd wrought in glass.
 In pearls and rubies rich the hawthorns show,
 While thro' the ice the crimson berries glow.
 The thick-sprung reeds which wat'ry marshes yield
 Seem'd polish'd lancets in a hostile field.
 The stag in limpid current with surprise
 Sees crystal branches on his forehead rise.
 The spreading oak, the beech, and tow'ring pine,
 Glaz'd over, in the freezing ether shine ;
 The frighted birds the rattling branches shun,
 Which wave and glitter in the distant sun.
 When, if a sudden gust of wind arise,
 The brittle forest into atoms flies,
 The crackling wood beneath the tempest bends,
 And in a spangled show'r the prospect ends ;
 Or if a southern gale the region warm,
 And by degrees unbind the wintry charm,
 The traveller a miry country sees,
 And journeys sad beneath the drooping trees :
 Like some deluded peasant, Merlin leads
 Thro' fragrant bow'rs and thro' delicious meads,
 While here enchanted gardens to him rise,
 And airy fabrics there attract his eyes,
 His wand'ring feet the magic paths pursue,
 And while he thinks the fair illusion true,
 The trackless scenes disperse in fluid air,
 And woods, and wilds, and thorny ways appear ;
 A tedious road the weary wretch returns,
 And as he goes, the transient vision mourns.

The single Night of Spitzbergen.

IN the dreary regions of Spitzbergen, the Snow exhibits phenomena not less singular than those of the ice. At first, it appears small and hard as the finest sand; it then changes its form to that of a hexagonal shield, into the shape of needles, crosses, cinquefoils, and stars, some plain, and some serrated rays. These forms depend upon the disposition of the atmosphere; and in calm weather, the snow coalesces, and falls in clusters.

The single night of this dreadful country begins about the 30th of October: the sun then sets, and never appears till about the 10th of February. A glimmering, indeed, continues some weeks after the setting of the sun: then succeed clouds and thick darkness, broken by the light of the moon, which is as luminous as in England, and, during this long night, shines with unfailling lustre. The cold strengthens with the new year; and the sun is ushered in with an unusual severity of frost. By the middle of March, the cheerful light grows strong; the arctic foxes leave their holes; and the sea-fowl resort, in great multitudes, to their breeding places. The sun

sets no more after the 14th of May; the distinction of day and night is then lost.

Vast regions dreary, bleak, and bare!
 There on an icy mountain's height,
 Seen only by the Moon's pale light,
 Stern Winter rears his giant form,
 His robe a mist, his voice a storm:
 His frown the shiv'ring nations fly,
 And, hid for half the year, in smoky caverns lie.

SCOTT.

In the height of summer, the sun has heat enough to melt the tar on the decks of ships; but from August its power declines: it sets fast. After the middle of September, day is hardly distinguishable, and, by the end of October, takes a long farewell of this country: the days now become frozen, and winter reigns triumphant.

Earth and soil are denied to the frozen regions of Spitzbergen: at least, the only thing which resembles soil, is the grit worn from the mountains by the power of the winds, or the attrition of cataracts of melted snow: this, indeed, is assisted by the putrefied lichens of the rocks, and the dung of birds, brought down by the same means. The composition of these islands is stone, formed by the sublime hand of omnipotent power; not fritted into segments, trans-

verse or perpendicular, but cast, at once, into one immense and solid mass. A mountain, throughout, is but a single stone, destitute of fissures, except in places cracked by the irresistible power of frost, which often causes lapses, attended by a noise like thunder, and scattering over their bases rude and extensive ruins.

The vallies, or rather glens, of this country, are filled with eternal ice or snow. They are totally inaccessible, and known only by the divided course of the mountains, or where they terminate in the ice-bergs or glaciers we have already described. No streams waters their dreary bottoms; and even springs are denied. The mariners are indebted for fresh water solely to the periodical cataracts of melted snow in the short season of summer, or to pools in the middle of the vast fields of ice.

Yet, even here, Flora deigns to make a short visit, and to scatter a scanty stock over the bases of the hills: her efforts never rise beyond a few humble herbs, which shoot, flower, and seed, in the short warmth of June and July, and then wither into rest until the succeeding year. Among these, however, the salubrious

scurvygrass, the resource of distempered frames, is providentially most abundant.

Such, after all, is the aspect of extreme sterility and desolation in these dreary regions, that we can scarcely imagine any mortal would be so hardy as to make them even a temporary abode. Yet here did four Russian mariners, who were accidentally left on this frozen coast in the year 1743, live six years (one excepted), till happily released by the arrival of a ship. In 1633, seven Dutch sailors were voluntarily left here to pass the winter, and to make their remarks; but they all perished from the effects of the scurvy. In the following year, seven more self-devoted victims of the same nation underwent a similar fate: yet all these adventurous men had been liberally provided with medicines, and every necessary for the preservation of life. Eight Englishmen, left by accident in the same country, in 1650, were far more fortunate: unprovided with every thing, they contrived, however, to frame a hut of some old materials, and were found by the returning ships, the next year, in perfect health. The Russians have lately attempted to colonize these dreadful islands. They have an-

nually sent parties to continue there the whole year, who have established settlements at Spitzbergen and other places adjacent, where they have built huts, each of which is occupied by two boats' crews, or twenty-six men. They bring with them salted fish, rye-flour, and the serum or whey of sour milk. The whey is their chief beverage, and is also used in baking their bread. Each hut has an oven which serves also as a stove; and their fuel is wood, which they bring with them from Archangel. Their huts are above ground, and surprisingly warm. They boil their fish with water and rye-meal: this is their winter diet. In summer, they live chiefly on fowls, or their eggs. They are dressed in the skins of the bear or the reindeer, with the fur side next their bodies; their bedding, likewise, is formed of the same. The skin of the fox, which is the most valuable, is preserved as an article of commerce. They have also other employment beside the chase, in catching, with nets, the beluga, or white whale. Few of them die from the severity of the cold; but they are often frost-bitten, so as to lose their toes or fingers; for they are so hardy as to hunt in all weathers. They are at liberty to leave the place by the

22d of September, whether they are relieved by a fresh party from Russia, or not. The great exercise they use; their vegetable food; their method of freshening their salt provision, by boiling it in water, and mixing it with flour; their beverage of whey; and their total abstinence from spirituous liquors; are the happy preservatives from the scurvy, which brought all the preceding adventurers, who perished, to their miserable end.

Sledges.

As sledges are much used in these northern countries, we shall briefly describe those used in Holland, Lapland, and Kamschatka.

These carriages are *without wheels*, and are frequently appropriated for carrying large weights, as huge stones, bells, etc. etc. The sledge on which a criminal is taken to the place of execution, is called a *hurdle*. But in cold countries, sledges are substituted for wheel-carriages, being more convenient for travelling on the *ice*, and over the boundless *snows*.

Dutch Sledges.

By the polite laws of Amsterdam, wheel-carriages are limited to a certain number, which is very inconsiderable compared with the size of the city, from an apprehension that an uncontrolled use of them might hazard the foundation of the houses, most of which are built upon piles; for nearly the whole of the ground on which this vast city stands was formerly a morass. A carriage, called by the Dutch a sley, and by the French a *traineau*, is used in their room; it is the body of a coach fastened by ropes on a sledge, and drawn by one horse; the driver walks by the side of it, which he holds with one hand to prevent its falling over, and with the other the reins. Nothing can be more melancholy than this machine, which holds four persons, moves at the rate of about three miles an hour, and seems more like the equipage of an hospital, than a vehicle in which the observer would expect to find a merry face; yet in this manner do the Dutch frequently pay visits and take the air.

Dogs are frequently employed in Holland, to draw *light sledges* fitted for the conveyance of provisions, etc. to a short distance. In Holland, according to Mr. Pratt, there is not an idle dog, of any material size, to be seen in the whole seven provinces. You

see them in *harness*, at all parts of the Hague, as well as in other towns, tugging at sledges or little carts with their tongue nearly sweeping the ground, and their poor palpitating hearts almost beating through their sides : frequently, three, four, five, or sometimes six abreast, drawing *men* and *merchandise* with the speed of little horses. On passing from Hague gate to Scheveling, you perceive at any hour of the day, an incredible number *loaded with fish and men*, under the burthen of which they run off at a long trot, and sometimes at full gallop, *the whole mile and half*, which is the precise distance from gate to gate ; nor on their return are they suffered to come with their sledges empty, being filled not only with the men and boys before mentioned, but with such commodities as are marketable at the village. This writer further adds, that it is no uncommon thing in the middle of summer, to see these poor, patient, persevering animals urged and driven, beyond their utmost ability, till they drop down on the road.

Ship-Sledges.

The Dutch have also a kind of sledge, on which they *can carry a vessel* of any burthen *by land*. It consists of a plank of the length of a keel of a moderate ship raised a

little behind, and hollow in the middle; so that the sides go a little a slope, and are furnished with holes to receive pins, etc. The rest is quite even.

Lapland Sledges.

These carriages are extremely light and elegant, and are covered at the bottom with the skin of the rein-deer. They are yoked to the sledge by a collar, from which a trace is brought under the belly, between the legs, and fastened to the forepart of the machine. The person who sits in it guides the animal with a cord fastened to its horns; he drives it with a goad, and encourages it with his voice. Those of the wild breed, though by far the strongest, often prove refractory, and not only refuse to obey their masters, but turn against him and strike so furiously with their feet, that his only resource is to cover himself with his sledge, upon which the enraged creature vents his fury: the tame deer on the contrary, is patient, active, and willing. When hard pushed, the rein deer will trot the distance of *sixty miles without stopping*; but, in such exertions, the poor, obedient creature fatigues itself so exceedingly, that its master is frequently obliged to kill it immediately, to prevent a lingering death that would ensue. In general, they can go *thirty*

miles without stopping, and that without any great or dangerous effort.

Obsequious at their call, the docile tribe
Yield to the *sled* their necks, and whirl them swift
O'er hill and dale, heaped into one expanse
Of *marbled snow*, as far as eye can sweep,
With a blue crust of ice unbounded glazed.

Sledges in Kamschatka.

The only method of travelling in this dreary country, during the winter is, drawn on a sledge by the strong, nimble, and active dogs of the country. They travel with great expedition. Capt. King relates, that during his stay there, a courier with dispatches, drawn by them, performed a journey of *two hundred and seventy miles in less than four days.*

The sledges are usually drawn by *five dogs*, four of them yoked two and two abreast: the foremost acts as a leader to the rest. The reins being fastened to a collar round the leading dog's neck, are of little use in directing the pack; the driver depending chiefly on their obedience to his voice, with which he animates them to proceed. Great care and attention are consequently used in training up those for leaders, which are more valuable according to their steadiness and docility; the sum of forty roubles, or nine

pounds being no unusual price for them. The rider has a crooked stick, answering the purpose of both whip and reins ; with which, by striking on the snow, he regulates the speed of the dogs, or stops them at his pleasure. When they are inattentive to their duty, he often chastises them by throwing it at them. He discovers great dexterity in regaining his stick, which is the greatest difficulty attending his situation ; for if he should happen to lose it, the dogs immediately discover the circumstance, and never fail to set off at full speed, and continue to run till their strength is exhausted, or till the carriage is overturned, and dashed to pieces, or hurried down a precipice.

CHAPTER VI.

Skating.

In giddy circles, whirling variously,
 The *skater* fleetly thrids the mazy throng.
 Trust not *incautiously* the smooth expanse;
 For oft a treach'rous thaw, ere yet perceived,
 Saps, by degrees, the solid-seeming mass.

THE winter of England, usually allows but few of those pastimes which continue for so long a period, in more northerly regions.

On blithsome frolics bent, the youthful swains;
 While every work of man is laid at rest,
 Fond o'er the river crowd in various sports
 And revelry dissolved; where mixing glad,
 Happiest of all the train! the raptured boy
 Lashes the whirling top. Or, where the *Rhine*
 Branches out in many a long canal extends,
 From every province swarming, void of care,
Batavia rushes forth; and as *they sweep*,
On sounding Skates, a thousand different ways
Or circling poise, swift as the wind, along,
 The then gay land is maddened all to joy.
 Nor less the Northern Courts, wide o'er the snow
 Pour a new pomp. Eager, on rapid sleds
 Their vig'rous youth in bold contention wheel
 The long resounding course. Mean-time, to raise
 The manly strife, with highly-blooming charms,
 Flushed by the season, Scandinavia's dames,
 Or Russia's buxom daughters, glow around.

Much of the above description, however, has for these few weeks past been realised, by the busy crowds assembled on our principal rivers and reservoirs. The Canal in St. James's Park, the Serpentine, and the noble THAMES Rivers, still daily present to our observation a truly delightful spectacle—a complete FROST FAIR, to which the pencil of a TENIERS, or a WILKIE, could alone do justice. The compiler of this work has been highly gratified with seeing the number of young persons engaged in the active and healthful employment of SKATING; and from a view to their improvement in this useful and elegant art, he has collected together some valuable information on the subject,—which he offers to the notice of his young friends, accompanied by his best wishes for the success of his instructions. These, if attended to, cannot fail of making an elegant and fearless Skater.

Origin of Skating.

Although the ancients were remarkable for their dexterity in most of the athletic sports, yet skating seems to have been unknown to them. According to the antiquaries, this exercise made its ap-

pearance in the thirteenth century.* It probably derived its origin in Holland, where it was practised, not only as a graceful and elegant amusement, but as an expeditious mode of travelling when the lakes and canals were frozen up during winter. In Holland, long journies are made upon skates with ease and expedition; but ingeneral, less attention is there paid to graceful and elegant movements, than to the expedition and celerity of what is called *journey skating*. It is only in those countries where it is considered as an amusement that its graceful attitudes and movements can be studied; and there is no exercise whatever better calculated to set off the human figure to advantage.

The acquirement of most exercises may be attained at an advanced period of life; but to become an expert skater, it is necessary to begin the practice of the art at a very early age. It is difficult to reduce the art of skating to a system. It is principally by the imitation of a good

* As to *sliding*, it is much older; and, although we cannot fix the precise date, we suppose that *sliding* and *ice* came in together. The slips, however, and trips made in our days, are, perhaps, real improvements; they have *great variety*, and we question if it may not be said that *every man invents his own downfall*.

skater that a young beginner can form his own practice. The English, though often remarkable for feats of agility upon skates, are very deficient in gracefulness; which is partly owing to the construction of the skates. They are too much curved in the surface which embraces the ice, consequently they involuntarily bring the users of them round on the outside upon a quick and small circle; whereas the skater, by using skates of a different construction, less curved, has the command of his stroke, and can enlarge or diminish the circle according to his own wish or desire.

Rules for Learners.

Those who wish to be proficient should begin at an early period of life; and should first endeavour to throw off the fear which always attends the commencement of an apparently hazardous amusement. They will soon acquire a facility of moving on the *inside*: when they have done this, they must endeavour to acquire the movement on the *outside* of the skates; which is nothing more than throwing themselves upon the *outer edge* of the skate, and making the balance of

their body tend towards that side, which will necessarily enable them to form a semicircle. In this, much assistance may be derived from placing a *bag of lead-shot* in the pocket next to the *foot employed in making the outside stroke*, which will produce an artificial poise of the body; this afterwards will become natural by practice.

At the commencement of the outside stroke, the knee of the employed limb should be a little bent, and gradually brought to a rectilinear position when the stroke is completed.—The following rules should also be carefully practised and strictly attended to:—they will be of the greatest service.

1. When the practitioner becomes expert in forming the semicircle with both feet, he is then to join them together, and proceed progressively and alternately with both feet, which will carry him forward with a graceful movement.

2. Care should be taken to use very little muscular exertion, for the impelling motion should proceed from the mechanical impulse of the body thrown into such a position as to regulate the stroke.

3. At taking the outside stroke, the body ought to be thrown forward easily,

the unemployed limb kept in a direct line with the body, and the face and eyes directly looking forward: the unemployed foot ought to be stretched towards the ice, with the toes in a direct line with the leg.

4. In the time of making the curve, the body must be gradually, and almost imperceptibly, raised, and the unemployed limb brought in the same manner forward: so that, at finishing the curve, the body will bend a small degree backward, and the unemployed foot will be about two inches before the other, ready to embrace the ice and form a correspondent curve.

5. The muscular movement of the whole body must correspond with the movement of the skate, and should be regulated so as to be almost imperceptible to the spectators.

6. Particular attention should be paid in carrying round the head and eyes with a regular and imperceptible motion; for nothing so much diminishes the grace and elegance of skating as sudden jerks, and exertions, which are so frequently used by the generality of skaters.

7. The management of the arms likewise deserves attention. There is no

møde of disposing of them more gracefully in skating outside, than folding the hands into each other, or using a muff.

There are various feats of activity and manœuvres used upon skates; but they are so various that we cannot pretend to detail them. *Moving on the outside* is the primary object for a skater to attain; and when he becomes an adept in that, he will easily acquire a facility in executing other branches of the art. There are few exercises but will afford him hints of elegant and graceful attitudes. For example, nothing can be more beautiful than the attitude of *drawing the bow and arrow* while the skater is making a large circle on the outside: the *manual exercise* and *military salutes* have likewise a pretty effect when used by an expert skater.

Skating is an amusement, well calculated for the severity of winter; as it contributes to promote both insensible perspiration, and the circulation of the blood. Hence, a Society has even been formed in Edinburgh, under the name of the *Skating-club*; the avowed object of which is the improvement of this recreation, so as to reduce it to the rules of art.—Excellence, however, can be attained only by observing the motions

of a skilful skater. This innocent pursuit, especially in the South of Britain, where the winters are generally mild, should not be encouraged, unless the ice be of considerable thickness: at the same time, some precaution is necessary to retire from this enticing diversion in *proper* time; because the body, being thrown into *sensible* perspiration, is thus rendered more susceptible of cold; and, unless due attention be paid to this circumstance, a cold will probably be the consequence.

We have heard that some skaters in the fens of Cambridgeshire and Huntingdonshire, have skated *two miles* in two MINUTES, the strokes on an average being each ten yards. This velocity exceeds that of most race horses, and the fatigue occasioned by it is much less.

A very remarkable skating-feat is said to have taken place during the late frost. A Mr. Maxwell, celebrated for his skill and dexterity in this useful art, *skated from Long Acre to St. James's Park* in FOUR MINUTES and *fifty seconds*. This was for a wager, and the given time was FIVE MINUTES.

To the native of HOLLAND, skating is quite as familiar as walking, and he puts on his skates with the same indifference as we

do our shoes;—these instruments, indeed, are indispensable to the Dutch in the winter season; and are used by men, women, and children, constantly. The women skate to market with provisions, and children of five or six years old and upwards, accompany them, not lazily hanging at their backs or on their arms, but each little skater with winged feet flies after its mother, and carries a little basket of eggs, or other articles along with it. *Interesting scene!* How admirably adapted are the manners and customs of mankind to the climates appointed for them by Providence. Skating is pursued in England as an *amusement only*, and for a single week, perhaps, in the course of the year; but in *Holland*, it is absolutely *necessary*, and supplies a cheap and commodious method of transport to all classes of people.

The Dutch skates are not so finely shaped as those we use; and the *skaters* are more remarkable for the *ease*, than *elegance* of their execution.

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