

Naturall Ireland 1652

Ireland's Naturall History : written by *Gerard Boate*

1652

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Being a true and ample Description of its Situation, Greatness, Shape, and Nature ; Of its Hills, Woods, Heaths, Bogs ; Of its Fruitfull Parts and profiable Grounds, with the severall way of Manuring and Improving the same : With its Heads or Promontories, Harbours, Roades and Bayes ; Of its Springs and Fountaines, Brookes, Rivers, Loughs ; Of its Metalls, Mineralls, Freestone, Marble, Sea-coal, Turf, and other things that are taken out of the ground. And lastly, of the Nature and temperature of its Air and Season, and what diseases it is free from, or subject unto. Conducing to the Advancement of Navigation, Husbandry, and other profitable Arts and Professions.

Written by Gerard Boate, late Doctor of Physick to the State in Ireland.

And now Published

BY

Samuell Hartlib, Esq ;

For the Common Good of *Ireland*, and more especially, for the benefit of the Adventurers and Planters therein.

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Of the Woods in Ireland.

Sect. 1. *Woods in Ireland are reckoned among the barren lands, and the reason thereof.*

AMONGST the barren parts of Ireland the Woods must also be counted, according to the usuall division of the lands of that Kingdom, whereby reckoning for fruitfull only the Meddows, Arable-grounds, and Pastures, they count all the rest for barren, comprehending them under these three generall heads, Bogs, Barren-mountains, and Woods. Which division as it is in the mouth of all them that have any insight into the matters of that Land, and do, or have lived there, so it is further confirmed by a number of Writings and Monuments, both of antienter times, and late ones, in the which it is very common and familiar : as for instance may appear by those severall Acts, which since this last Rebellion of the Irish have been made by the Parliament of England in the behalf of the Adventurers who have layd out their monyes for the reconquering of the revolted parte of that Kingdom.

For although the land which the Woods do take up, is in it self very good in most places, and apt to hear both Corn and Grass plentifully (whereof more shall be said by and by) yet as long as the Woods remain standing, it is unfit not only to be made either Arable or Meddow (as in itself is most evident) but even for Pasture, by reason of the overmuch moisture, the roots of the trees staying the rain-water, so as it hath not the liberty to pass away readily, and their stems and branches hindering the free access of the Wind and Sun, wherennto commeth in many parts the grounds own wateriness, occasioned by Springs there arising, and by its

situation apt for the gathering and keeping of water, which maketh them for the most part so muddy and boggy, that cattell cannot conveniently feed in them.

Sect. 3. Woods much diminished in Ireland since the first comming in of the English.

In antient times, and as long as the land was in the full possession of the Irish themselves, all Ireland was very full of Woods on every side, as evidently appeareth by the writings of *Giraldus Cambrensis*, who came into Ireland upon the first Conquest, in the company of *Henry the Second*, King of England, in the year of our Saviour eleven hundred seventy and one. But the English having settled themselves in the land, did by degrees greatly diminish the Woods in all the places where they were masters, partly to deprive the Theeves and Rogues, who used to lurk in the Woods in great numbers, of their refuge and starting-holes, and partly to gain the greater scope of profitable lands. For the trees being cut down, the roots stubbed up, and the land used and tilled according to exigency, the Woods in most part of Ireland may be reduced not only to very good Pastures, but also to excellent Arable and Meddow.

Through these two causes it is come to pass in the space of many yeares, yea of some ages, that a great part of the Woods, which the English found in Ireland at their first arrival there, are quite destroyed, so as nothing at all remaineth of them at this time.

Sect. 3. Diminishing of the Woods during the last Peace.

And even since the subduing of the last great Rebellion of the Irish before this, under the conduct of the Earl of Tirone (overthrown in the last yeares of Queen Elizabeth by her Viceroy Sir *Charles Blunt*, Lord Mountjoy, and afterwards Earl of Devonshire) and during this last Peace of about forty yeares (the longest that Ireland ever enjoyed, both before and since the comming in of the English) the remaining woods have very much been diminished, and in sundry places quite destroyed, partly for the reason last mentioned, and partly for the wood and timber it self, not for the ordinary uses of building and firing (the which ever having been a-foot, are not very considerable in regard of what now we speak of) but to make merchandise of, and for the making of Charcoal for the Iron works. As for the first, I have not heard that great timber hath ever been used to be sent out of Ireland in any great quantity, nor in any ordinary way of Traffick ; but only Pipe-staves, and the like, of which good store hath been used to be made, and sent out of the land, even in former times, but never in that vast quantity, nor so constantly as of late years, and during the last Peace, wherein it was grown one of the ordinary merchandable commodities of the cuntry, so as a mighty Trade was driven in them, and whole ship-loads sent into forreine countries yearly ; which as it brought great profit to the proprietaries, so the felling of so many thousands of trees every year as were employed that way, did make a great destruction of the Woods in tract of time. As for the Charcoal, it is incredible what quantity thereof is consumed by one Iron-work in a year ; and whereas there was never an Iron-work in Ireland before, there hath been a very great number of them erected since the last Peace in sundrie parts of every Province : the which to furnish constantly with Charcoales, it was necessary from time to time to fell an infinite number of trees, all the lopings and windfals being not sufficient for it in the least manner.

Sect. 4. Great part of Ireland very hare of Woods at this time.

Through the aforesayd causes Ireland hath been made so bare of Woods in many parts, that the inhabitants do not only want wood for firing (being therefore constrained to make shift with turf, or sea-coal, where they are not too far from the sea) but even timber for building, so as they are necessitated to fetch it a good way off, to their great charges, especially in places where it must be brought by land : And in some parts you may travell whole dayes long without seeing any woods or trees except a few about Gentlemens houses ;

as namely from Dublin, and from places that are some miles further to the South of it, to Tredagh, Dundalke, the Nurie, and as far as Dremore ; in which whole extent of land, being above threescore miles, one doth not come neer any woods worth the speaking of, and in some parts thereof you shall not see so much as one tree in many miles. For the great Woods which the Maps do represent unto us upon the Mountains between Dundalke and the Nurie, are quite vanished, there being nothing left ; of them these many yeares since, but one only tree, standing close by the highway, at the very top of one of the Mountains, so as it may be seen a great way off, and therefore serveth travellers for a mark.

Sect. 5. Many great Woods still left in Ireland.

Yet notwithstanding the great destruction of the Woods in Ireland, occasioned by the aforesayd causes, there are still sundry great Woods remaining, and that not only in the other Provinces, but even in Leinster it self. For the County of Wickloe, Kings-county, and Queens-county, all three in that Province, are throughout full of Woods, some whereof are many miles long and broad. And part of the Counties of Wexford and Carlo are likewise greatly furnished with them.

In Ulster there be great Forests in the County of Doneghall, and in the North part of Tirone, in the Country called Glankankin. Also in the County of Fermanagh, along Lough-Earn ; in the County of Antrim ; and in the North-part of the County of Down ; in the two Countries called Killolta and Kilwarlin ; besides severall other lesser Woods in sundrie parts of that Province. But the County of Louth, and far the greatest part of the Counties of Down, Armagh, Monaghan, and Cavan (all in the same Province of Ulster) are almost every where bare, not only of Woods, but of all sorts of Trees, even in places which in the beginning of this present Age, in the War with Tirone, were encumbred with great and thick Forests.

In Munster where the English, especially the Earl of Cork, have made great havock of the Woods during the last Peace, there be still sundrie great Forests remaining in the Counties of Kerry, and of Tipperary ; and even in the County of Cork, where the greatest destruction thereof hath bin made, some great Woods are yet remaining, there being also store of scattered Woods both in that County, and all the Province over.

Connaught is well stored with trees in most parts, but hath very few Forests or great Woods, except in the Counties of Majo and Sleigo.

Of the Mines in Ireland, and in particular of the Iron Mines.

Sect 1. All the Mines in Ireland discovered by the New-English.

THE Old-English in Ireland, that is, those who are come in from the time of the first Conquest, untill the beginning of Queen *Elizabeth's* reign, have been so plagued with Wars from time to time, one while intestine among themselves, and another while with the Irish, that they could scarce ever find the opportunity of seeking for Mines, and searching out the Metalls hidden in the bowels of the Earth. And the Irish themselves, as being one of the most barbarous Nations of the whole earth, have at all times been so far from seeking out any, that even in these last yeares, and since the English have begun to discover some, none of them all, great nor small, at any time hath applied himself to that business, or in the least manner furthered it.

So that all the Mines which to this day are found out in Ireland, have been discovered (at least as for to make any use of them) by the New-English, that is, such as are come in during, and since the reign of Queen *Elizabeth*. Severall whereof having begun to give their minds to it during the last Peace, have in a few yeares found out a great many Iron-Mines in sundrie

parts of the Kingdom, and also some of Lead and Silver ; which greatly confirmeth the opinion of many knowing persons, who hold that the Mountains of Ireland are full of Metals, and that if the same industry and diligence had been used by the inhabitants of that Country in former Ages, as there hath been since the beginning of the present, many more Mines might have been discovered, not only of the same Minerals as have been found out hitherto, but of others also, and perhaps even of Gold it self.

Sect. 2. Grounds to believe that there are Gold mines in Ireland.

I beleeve many will think it very unlikely, that there should be any Gold-mines in Ireland ; but a credible person hath given me to understand, that one of his acquaintance had severall times assured him, that out of a certain rivelet in the County of Nether Tirone, called Miola (the which rising in the Mountains Slew-galen, and passing by the village Maharry, falleth into the North-west corner of Lough Neaugh, close by the place where the river Band commeth out of it) he had gathered about one dram of pure gold ; concluding thereby, that in the aforesayd Mountains rich Gold-mines do lye hidden.

For it is an ordinary thing for Rivers, which take their originall in gold-bearing mountains, to carry Gold mixt with their sand ; the which may be confirmed by many instances, and to say nothing of severall rivers of that kind, mentioned by *Strabo*, *Pliny*, and other old Geographers and Historians, nor of Pactolos and Hermus in Lydia, and Tagus in Spain, whereof all the old Poets are full ; it is certain, that in our very times seyerall rivers in Germanie, as the Elbe, Schwarts, Sala, and others, do carry gold, and have it mixed with their sands ; out of the which by the industry of man, it is collected.

Sect 3. Three sorts of Iron-mines in Ireland : and first of the first sort, Bog-mine.

But to let alone uncertain conjectures, and to content ourselves with the Mines that are already discovered, we will in order speak of them, and begin with the Iron-mines. Of them there are three sorts in Ireland, for in some places the Oar of the Iron is drawn out of Moores and Bogs, in others it is hewen out of Rocks, and in others it is digged out of Mountains : of which three sorts the first is called Bog-mine, the other Rock-mine, and the third with severall names White-mine, Pin-mine, and Shel-mine.

The first sort, as we have said, and as the name it self doth shew, is found in low and boggie places, out of the which it is raised with very little charge, as lying not deep at all, commonly on the superficies of the earth, and about a foot in thickness. This Oar is very rich of metall, and that very good and tough, nevertheless in the melting it must be mingled with some of the Mine or Oar of some of the other sorts : for else it is too harsh, and keeping the furace too hot, it melteth too suddenly, and stoppeth the mouth of the furnace, or, to use workmens own expression choaketh the furnace. Whilst this Oar is new, it is of a yellowish colour, and the substance of it somewhat like unto clay, but if you let it lye any long time in the open air, it groweth not only very dry, as the clay useth to do, but moldereth and dissolveth of it self, and falleth quite to dust or sand, and that of a blackish or black-brown colour.

Sect. 4. Of the second sort of Iron-mine, called Rock-mine.

The second sort, that which is taken out of Rocks, being a hard and meer stony substance, of a dark and rustie colour, doth not lye scattered in severall places, but is a piece of the very rock, of the which it is hewn : which rock being covered over with earth, is within equallie every where of the same substance ; so as the whole Rock, and every parcell thereof, is Oar of Iron. This mine, as well as the former, is raised with little trouble, for the Iron-rock being full of joints, is with pick-axes easily divided and broken into pieces of what bigness one

will : which by reason of the same joints, whereof they are full every where, may easily be broke into other lesser pieces ; as that is necessary, before they be put into the furnace.

This Mine or Oar is not altogether so rich as the Bog-mine, and yeeldeth very brittle iron, hardly fit for any thing else, but to make plow-shares of it (from whence the name of colt-share Iron is given onto it) and therefore is seldom melted alone, but mixed with the first or the third sort.

Of this kind hitherto there hath but two Mines been discovered in Ireland, the one in Munster, neer the town of Tallo, by the Earl of Cork his Iron works ; the other in Leinster, in Kings-county, in a place called Desert land, belonging to one Serjeant Major *Piggot*, which rock is of so great a compass, that before this rebellion it furnished divers great Iron-works, and could have furnished many more, without any notable diminution ; seeing the deepest pits that had been yet made in it, were not above two yards deep. The land, under which this rock lyeth, is very good and fruitfull, as much as any other land thereabouts, the mold being generally two feet and two and a half, and io many places three feet deep.

Sect. 5. *Of the third sort of Iron-mine.*

The third sort of Iron-mine is digged out of the mountains, in severall parts of the Kingdome ; in Ulster, in the County of Fermanagh, upon Lough Earn ; in the County of Cavan, in a place called Douballie, in a drie mountain ; and in the County of Nether-Tirone, by the side of the rivelet Lishan, not far from Lough Neaugh ; at the foot of the mountains Slew-galen mentioned by us upon another occasion, in the beginning of this chapter : in Leinster, in Kings-county, hard by Mountmelick ; and in Queenes-county, two miles from Monrath : in Connanght ; in Tomound or the County of Clare, six miles from Limmerick ; in the County of Roscomen, by the side of Lough Allen ; and in the County of Letrim, on the East-side of the said Lough, where the mountains are so full of this metall, that thereof it hath got in Irish the name of *Slew Neren*, that is, Mountains of Iron : and in the Province of Munster also in sundrie places.

This sort is of a whitish or gray colour, like that of ashes ; and one needs not take much pains for to find it out, for the mountains which do contain it within themselves, do commonly shew it of their own accord, so as one may see the veins thereof at the very outside in the sides of the mountains, being not very broad, but of great length, and commonly divers in one place, five or six ridges the one above the other, with ridges of earth between them.

These Veins or Ridges are vulgarly called Pins, from whence the Mine hath the name of Pin-mine ; being also called White-mine, because of its whitish colour ; and Shell-mine, for the following reason : for this stuff or Oar being neither loose or soft as earth or clay, neither firm and hard as stone, is of a middle substance between both, somewhat like unto Slate, composed of shells or scales, the which do lye one upon another, and may be separated and taken asunder very easily, without any great force or trouble. This stuff is digged out of the ground in lumps of the bigness of a man's head, bigger, or less, according as the Vein affordeth opportunitie. Within every one of these lumps, when the Mine is very rich and of the best sort (for all the Oar of this kind is not of equall goodness, some yeelding more and better Iron than other) lieth a small kernell which hath the name of Hony-comb given to it, because it is full of little holes, in the same manner as that substance whereof it borroweth its appellation.

The Iron comming of this Oar is not brittle, as that of the Rock-mine, but tough, and in many places as good as any Spanish Iron.

Sect. 6. *Iron-works erected by the English.*

The English having discovered these Mines, endeavoured to improve same, and to make profit of them, and consequently severall Iron-works were erected by them in sundrie parts of the land, as namely by the Earl of Cork in divers places in Munster ; by Sir *Charles Coot* in the Counties of Roscomen and Letrim, in Connaght, and in Leinster by Monrath, in Queenes-county ; by the Earl of London-derry at Ballonakill, in the sayd county ; by the Lord Chancelour Sir *Adam Loftus*, Viscount of Ely, at Mountmelik, in Kings-county ; by Sir *John Dunbar* in Fermanagh, in Ulster ; and another in the same county, by the aide of Lough-Earn, by Sir *Leonard Blevherhasset* ; in the county of Tomond, iu Connaught, by some London-Merchants ; besides some other Works in other places, whose first erectors have not come to my knowledge.

In imitation of these have also been erected divers Iron-works in sundrie parts of the sea coast of Ulster and Munster, by persons, who having no Mines upon or near their own Lands, had the Oar brought unto them by sea out of England ; the which they found better cheap than if they had caused it to be fetched by land from some of the Mines within the land. And all this by English, whose Industrie herein the Irish have been so far from imitating, as since the beginning of this Rebellion they have broke down and quite demolished almost all the fore-mentioned Iron-works, as well those of the one as of the other sort.

Of the Iron-works ; their fashion, charges of erecting and maintaining them, and profit comming of them : With an exact description of the Manner of melting the Iron in them.

Sect 1. *The fashion of the Iron-works.*

THE fashion of Iron-works, of whose erection we have spoke in the end of the foregoing Chapter, is such as followeth. At the end of a great Barn standeth a huge furnace, being of the height of a pike and a half, or more, and four-square in figure, but after the manner of a Mault-kiln, that is narrow below, and by degrees growing wider towards the top, so as the compass of the mouth or the top is of many fathoms. This mouth is not covered, but open all over ; so that the flame, when the furnace is kindled, rising through the same without any hindrance, may be seen a great way off in the night, and in the midst of the darkness maketh a terrible shew to travellers, who do not know what it is.

These Ovens are not kindled with wood, nor with sea-coal, but meerly with char-coal, whereof therefore they consume a huge quantity : For the Furnace being once kindled, is never suffered to go out, but is continually kept a burning from the one end of the year to the other : and the proportion of the coals to the Oar is very great : For the mine would not melt without an exceeding hot fire ; the which that it may be the more quick and violent, it is continually blowing day and night without ceasing by two vast pair of bellows, the which resting upon main peeces of timber, and with their pipes placed into one of the sides of the Furnace, are perpetually kept in action by the means of a great Wheel, which being driven about by a little brook or water-course, maketh them rise and fall by turns, so that whilst the one pair of bellows doth swell and fill it self with wind, the other doth blow the same forth into the Furnace.

Sect 2. *Of the lesser Iron-works, called Bloomeries : Of the Hammer-works : And of the Casting-works.*

There is another and lesser sort of Iron-works, much different from the former : for instead of a Furnace they use a Hearth therein, altogether of the fashion of a Smith's Hearth, whereon the Oar being laid in a great heap, it is covered over with abundance of Charcoal, the which

being kindled, is continually blown by bellows that are moved by wheel and water-courses, in the same manner as in the other Works.

These Works, commonly called Bloomeries, are in use, or were so before the Rebellion in sundrie places of the North-parts of Ulster.

Besides these two sorts of Works, where the Iron-mine is melted, there is a third sort, where the Iron after the first melting is hammered out into bars, of which we shall have occasion to speak more in the latter end of this present Chapter.

There are also in some parts of Ireland yet another kind of Iron-works differing from all the former, where the Iron was cast into Ordnance, Pots, small round Furnaces, and other things ; of which Works Mr. *Christopher Wandsworth*, Master of the Rolls of Ireland, and in his latter dayes Lord Deputy of the same Kingdom under the Earl of Strafford, then Lord Lieutenant thereof, had one upon his lands by Idoagh in the County of Carlo ; whereof we cannot give the Reader any particulars, because we have not yet been informed thereof.

Sect. 3. *Conveniencies requisite to the erecting of an Iron-work.*

In the erecting of these Works men seek to make them as near to the Mine as may be, to get the more profit by them : for the greater the distance is, the greater are the charges in having the Oar brought from the Mine to the Furnace, especially where all must be carried by land, the which doth fall out so in far the most places.

But many times one is necessitated to make the Works a good way farther from the Mine, than otherwise one would, because of the Water-courses, the which being of very great consequence in the well settling of a Work, and absolutely necessary (the wheels being all moved by water) those places must be made choice of, where one may have the conveniency of Water-courses. And besides all this, regard must be had to the nearness of the Woods, partly by reason of the Timber, a great deal whereof is necessary for the erecting of one of these Workes, and chiefly for the char-coals sake, of which a vast quantity continually is requisite, as before we have shewed.

Sect. 4. *The charges of erecting and maintaining an Iron-work.*

It is to be observed, that although there be Wood enough upon ones land, and that not very far from the Mine, together with the conveniencies of Water-courses, so as the water needeth not to be brought from very far off, nevertheless the charge is very great, both of erecting and stocking one of the Iron-works, and of maintaining it and keeping it afoot, and that by reason of the great number of Workmen and Labourers of severall sorts, which thereunto is requisite ; a list of whose names and offices here followeth : Wood-cutters, who fell the timber ; Sawyers, to saw the timber ; Carpenters, Smiths, Masons, and Bellow-makers, to erect the Iron-works, with all the appurtenances thereof, and to repair them from time to time ; Water-leaders, or Water-course-keepers, to steer the Water-courses, and to look to them constantly ; Basket-makers to make Baskets for to carry the Oar and other materials ; Boatmen, and Boat-wrights to make the Boats, and to go in them ; Diggers, who work in the Mine, and dig the same ; Carriers, who carry the Oar from the Mine ; Colliers, who make the Char-coal ; Corders who bring the Char-coal to the work ; Fillers, whose work it is from time to time to put the Mine and the coals into the furnace ; keepers of the furnace, who look to the main work, rake out the ashes and cinders, and let out the molten metall at convenient times ; finers, who look to the works where the Iron is hammered ; hammerers, whose work it is to see the Iron hammered out : besides severall other labourers, who having no particular task, must help to put their hand to every thing : of all which sorts of men Sir *Charles Coot* the elder, that zealous and famous Warriour in this present warre against the Irish Rebels

(wherein having done many memorable exploits, he lost his life in the first year thereof) did continually keep at work some five-and-twenty or six-and-twenty hundred, at his Iron-works, being three in number. Whereby may easily be gathered the greatness of the expences in erecting and maintaining of Iron-works ; and for all this the owners thereof did greatly gain thereby, ordinarily no less than forty in the hundred *per annum*.

Sect. 5. *Of the profit of the Iron-works instanced in those of Sir Charles Coot by Monrath.*

To speak somewhat more particularlie both of the charges and the profits of these Iron-works, we shall instance the matter in one of the works of the said Sir *Charles Coot*, namely that which he had in the Lordship of Monrath, in Queenes-county. At that work the Tun (that is twenty hundred weight) of Rock-mine at the fumace head came in all to stand in five shillings six pence sterling, and the Tun of White-mine, which he had brought him from a place two miles further off in seven shillings. These two were mixed in that proportion, that to one part of Rock-mine were taken two parts of White-mine : for if more of the Rock-mine had bin taken, the Iron would not have bin so good, and too brittle ; and being thus mixed, they yeilded one third part of Iron : that is to say, of two tuns of White-mine, and one of Rock-mine, being mingled and melted together, they had one ton of good Iron, such as is called Merchants-Iron, being not of the first, but second melting, and hammered out into barres, and consequently fit for all kinds of use.

This Iron he sent down the river Oure (by others called the Nure) to Rosse and Waterford in that kind of Irish boates which are called Cots in that countrie, being made of one piece of timber: which kind of ill-favoared boats (mentioned also by us above) are very common throughout all Ireland, both for to pass rivers in, and to carry goods from one place to another ; and not only upon shallow waters, such as the aforementioned River is in the greatest part of its course, but even upon the great Rivers and Loughs.

At Waterford the Iron was put aboard of ships going for London, where it was sold for sixteen, otherwhiles for seventeen pounds sterling, and sometimes for seventeen and a half ; whereas it did not stand Sir *Charles Coot* in more than betwixt tenne and eleven pounds sterling, all charges reckoned, as well of digging, melting, fining, as of carrying, boats-hire, and freight, even the Custome also comprehended in it.

Sect. 6. *Some other particulars about the smite subject, of the profit of the Iron-works.*

In most of the other places did a Tun of the Iron-mine or Oar come to stand in five, five and a half, and six shillings sterling at the furnace head ; and it was an ordinary thing, as well where they used White-mine, as where they mixed Rock-mine with it, to have a Tun of good Iron out of three tons of Oar : in some places, where the Mine was richer, they would have a Tun of Iron out of only two Tuns and a half of Oar. Nevertheless few of them gained more or as much as Sir *Charles Coot*, because they had not the same conveniencie of transportation : And he himselfe did not gain so much by his Iron-works in Connaught, as by that neer Monrath, although the Mines there afforded a richer Oar, and that the Ton thereof did cost him but three shillings at the furnace because that Lough Allen, whereonto the same Mines and Works are contiguous, gave him the opportunitie of carrying the Oar by Water from the Mine into the Work, and that in boates of forty tuns.

The Earl of Cork whose Iron-works being seated in Munster, afforded unto him very good opportunitie of sending his Iron out of the land by shipping, did in this particular surpass all others, so as he hath gained great treasures thereby : and knowing persons, who have had a particular insight into his affaires, do assure me, that he hath profited above one hundred thousand pounds clear gain by his said Iron-works.

Sect. 7. The manner of melting the Iron-oar.

The manner of melting the Iron, usuall in Ireland, is thus. The furnace is not filled to the top, but some space is left emptie, and to put new stuff into it they do not stay untill the former be quite consumed, but only untill it be somewhat descended, and then they cast into it some charges or basket-fuls of Coales, and at the top of them the same quantity of Mine : and thus they do from time to time, so as the furnace is in a manner alwaies in one and the same estate ; where is to be observed, that in most furnaces they adde unto the Oar and Coales some quantity of Iron-cinders, and in others of Limestone, whereby the melting of the Iron is greatly furthered, and the furnace made to work more mildly.

Within the barn, at the bottome of the furnace, stand constantly two men, one of each side, the which with long iron hooks, through holes left for the purpose, do every quarter of an hour draw out the unburnt coales, ashes, and cinders ; which cinders are great lumps of a firm substance, but brittle, of a blackish colour, shining but not transparent ; being nothing else but the remainder of the Iron-oar, after that the Iron which was contained in it, is melted out on't.

The Iron it self descendeth to the lowest part of the furnace, called the Hearth ; the which being filled, (so that, if one stayed longer, the Iron would begin to swim over through the aforesaid holes) they unstop the Hearth, and open the mouth thereof (or the Timpas the Arts-men call it) taking away a little door, of fashion like unto that of a baker's oven, wherewith the same was shut up very close. The floor of the barn hath a mold of sand upon it, wherein, before they open the furnace, a furrow is made, of sufficient breadth and depth, through the whole length of the barn, from the bottome of the furnace untill the barns door ; into which furrow, as soon as the furnace is opened, the molten Iron runneth very suddenly and forcibly, being to look on like unto a stream or current of fire. It remaineth a long time hot, but doth presently loose its liquidness and redness, turning into a hard and stiff mass, which masses are called Soves by the workmen.

Sect. 8. Of the different Bigness of the Iron Soves.

These masses or Soves of Iron are not alwaies of one and the same weight and bigness, but there is them of all sizes, from one hundred weight untill thirtie hundred : which difference doth chiefly depend on the different bigness of the furnace and hearth, and partly on the will and discretion of the workmaster or founder, and according as he either stayeth until the hearth be full, or letteth out the Iron sooner ; but ordinarily they do not use to cast, or to open the hearth, under less than twelve houres, nor to stay much longer than four-and-twenty.

And here is to be observed, that even in furnaces of the same bigness, yea in the self-same furnaces, the same quantity of Iron is not alwaies cast in the same space of time : but that varieth both according to the nature of the oar, and according to the different seasons of the year. For within the same compasse of time you shall cast a greater quantitie of Iron out of a rich Mine or Oar, than out of a lean one ; and in the summer time, when the coales come in dry and fresh, than in the winter.

Sect. 9. Of the refining of the Sow-Iron, and the hammering it into Barres.

The Soves are with teams of Oxen drawn to the Hammer-works, where being put into the fire again, they melt them into the finerie, the finer turning the melted stuff to and fro, till it come to be a solid body, then he carrieth it under the hammer, where it is hammered out into such flat narrow and thin bars, as are to be seen every where : the hammers being huge big ones, and never ceasing from knocking day nor night, as being kept at work by the means of certain Wheels, turned about by Water-courses in the same manner as the wheels of the Bellows.

By means of this second melting, and of that mighty hammering, the Iron is freed from a mighty deal of dross and dregs which it kept sticking to it, thorough its whole substance, in the first melting ; and so of impure called Sow-Iron, becometh to be usefull, such as is accustomed to be delivered onto Merchants, being therefore called Merchants-Iron ; one Tun whereof is usually had out of a Tun and a half of Sow-Iron ; but if that be of the best sort, and cast of the best Oar, two hundred pounds less of it will yeeld the aforesayd quantity of a Tun of Merchants-Iron.

Of the Mines of Silver and Lead in Ireland : and occasionally of the pestiferous Damps and Vapours within the Earth.

Sect. 1. *Of the severall Mines of Silver and Lead, and in particular that of Tipperary.*

MINES of Lead and Silver in Ireland have to this day been found out, three in number ; one in Ulster, in the County of Antrim, very rich, forasmuch as with every thirty pounds of Lead it yeeldeth a pound of pure Silver; another in Connaught, upon the very Harbour-month of Sligo, in a little Demy-Iland commonly called Conny-Iland ; and a third in Munster. The first two having been discovered but a few years before this present Rebellion, were through severall impediments never taken in hand yet ; wherefore we shall speak only of the third.

This Mine standeth in the County of Tipperary, in the Barony of Upper Ormond, in the Parish of Kilmore, upon the Lands of one *John Mac-Dermot O-kennedy*, not far from the Castle of Downallie, twelve miles from Limerick, and three-score from Dublin. The land where the Mine is, is moimtainous and barren ; but the bottoms, and the lands adjoyning, are very good for Pasture and partly Arable ; of each whereof the Miners had part, to the value of twenty pounds sterling *per annum*, every one. It was found out not above forty years ago, but understood at the first only as a Lead-mine, and accordingly given notice of to *Donogh* Earl of Thomond, then Lord President of Munster, who made use of some of the Lead for to cover the house which he then was building at Bunrattie : But afterwards it hath been found, that with the Lead of this Mine there was mixed some Silver.

Sect. 2. *The manner of digging this Mine the nature of the Oar, and what proportions of Silver and Lead it yeelds.*

The Veins of this mine did commonly rise within three or four spits of the superficies, and they digged deeper as those Veins went, digging open pits very far into the ground, many fathoms deep, yea Castle-deep ; the pits not being steep, but of that fashion as people might go in and out with wheel-barrows, being the only way used by them for to carry out the Mine or Oar. The water did seldom much offend them ; for when either by the falling of much rain, or by the discovering of some Spring or Water-source, they found themselves annoyed by it, they did by Conduits carry it away to a brook adjoyning, the Mountain being so situate, as that might be done easily.

This Mine yeelds two different sorts of Oar ; of which the one, and that the most in quantitie, is of a reddish colour, hard, and glistering ; the other is like a Marle, something blewish, and more soft than the red ; and this was counted the best, producing most Silver, whereas the other, or glistering sort, was very barren, and went most away into litteridge or dross.

The Oar yeilded one with another three pound weight of Silver out of each Tun, but a great quantitie of Lead so as that was counted the best profit to the former.

Besides the Lead and Silver the Mine produced also some Quicksilver, but not any Alome, Vitriol, or Antimony, that I could hear of.

Sect 3. *Profits of this Mine. It hath been destroyed by the Irish Rebels.*

The Silver of this Mine was very fine, so as the Farmers sold it at Dublin for five shillings two pence sterling the ounce ; as for the Lead, that they sold on the place for eleven pounds sterling the Tun, and for twelve pounds at the City of Limerick. The King had the sixth part of the silver for his share, and the tenth part of the Lead, the rest remaining to the farmers, whose clear profit was estimated to be worth two thousand pounds sterling yearly.

All the Mills, Melting-houses, Refining-houses, and other necessary Work-houses, stood within one quarter of a mile at the furthest from the place where the Mine was digged, every one of them having been very conveniently and sufficiently built and accommodated by the Officers and substitutes of Sir *William Russell*, Sir *Basil Brook*, and Sir *George Hamilton*, which three persons successively had this Mine in farm from the King, but in the beginning of this present Rebellion all this hath been destroyed by the Irish under the conduct of *Hugh O-kennedy*, brother of *John Mac-Dermott O-Kennedy*, on whose lands the Mine was situated : which Rebels not content to lay waste the mine, and to demolish all the works thereunto belonging, did accompany this their barbarousness with bloody cruelty against the poor workmen, such as were employed about the melting and refining of the Oar, and in all offices thereunto belonging : the which some of them being English, and the rest Dutch (because the Irish having no skill at all in any of those things, had never been employed in this mine otherwise than to digg it, and to do other labours) were all put to the sword by them, except a very few, who by flight escaped their hands.

Sect. 4. *This Mine free from deadly vapours, the which otherwise in Ireland are bred within the Earth, as well as in other Countries, as is instanced in a very remarkable History.*

I have not heard that any of the Miners hath been stifled in this Mine, a thing ordinary enough in other countries : the reason whereof I conceive to be, because the work was done in wide and open pits, wherein the like noxious vapours can neither be so easily engendred, and when they arise find a free passage into the open air, to the contrary of those close and narrow vaults usuall in the most part of other mines.

For else that the Earth of Ireland is subject, as well as that of other countries, to breed dangerous damp within her self, is undoubted, as evidently it appeared in the year sixteen hundred thirty-sven, by this following accident.

A Maulter living in the suburbs of Dublin in St. Francis-street caused a Well to be digged three yards deep, which yeelding but little water, and that not very sweet nor dear, resolved to have it made deeper ; and injoynd a servant of his, to work at it at spare times, which he doing, and having digged a yard and a half lower, the water of it begun the 24 of August to bubble up in a strange manner, making a great noise ; which having continued two dayes, without any notable increase, hardly comming half-way the knees ; he went down again into the Well, to digge there according to his custome. But having wrought but a little while, and being taken with a sudden giddiness in his head, and faintness at his heart, made hast to get out, and being revived, returned to fetch away his spade and other instruments; but comming to the bottom he fell into a deadly sown, which being seen by those that were present, one of them went down to help him up ; unto whom the same accident happened. All the spectators being greatly astonished, and their tamult having drawn-on a great concourse of people, the place where the Well was being an open yard, looking into the main street ; a certaine man, newly come to town, and casually passing by that way, not affrighted by the example of those two, had the courage to go down to fetch the former out, but with as ill success as they themselves. The wonder and amazement being hereby increased among the people, there was nevertheless a Butcher (a bold robustuous man) who having drunk somewhat liberally, would notwithstanding these sad accidents go in, which at the first not being suffered, and he con-

tinuing in his resolution, was at last permitted on condition that he let a strong cord be tyed about his wayst to pull him out, if he found himself ill ; the which to signifie he was to hold up his right hand. But being come to the bottome ; and suddenly taken with a deadly faintness, that he had neither time nor power to give the appointed sign, felling from the ladder ; and being haled out with all possible speed, found to be in a deep trance, but with perfect signs of life : wherefore being carried to his own house, put into his bed, and care taken of him, it was nevertheless 24 houres before he came to himself.

The dead bodies being drawn out of the Well it was filled with earth by order of the Magistrate of the said City.

Sect. 5. Relation of an accident like the former happened at London.

The like accidents have at severall times been seen in other Countries, whereof we could alledge many instances, but passing by all other we shall make mention of one lately befallen here at London. Without Aldesgate, there is a little court called Carpenters-yard, in the midst of which there stood a Pump ; the water whereof not being good for to dress meat, was used by the neighbours only for the washing and cleaning of their houses, and the like. But in length of time being grown so thick and muddy that no use could be made on't, it was resolved that the Well, whereout the Pump drew its water, should be made clean, to which purpose the Pump being taken down, in the latter end of July *anno* sixteen hundred fourtie-four, a laborer was let down, with a cord into the Well, being little and narrow, to take out the mud by pailles full, which as soon as he came to the bottome presently fell stark dead. Those that had let him down, seeing this, and suspecting nothing else, but that a sudden faintness had overcome him, let down another to see what he ayled, and to bring him out. But he sped no better than the first, which when the people perceived, no more went into the Well, untill three or four houres after, in which middle space of time a great Iron pan or plate, heaped up with burning charcoal, had been let down into the Well, and severall times as the fire did slacken, renewed, that through the heat thereof that mortiferous vapour might be overcome and dispersed, the which accordingly fell out ; so that the person afterwards went down to fetch away the dead bodies, got no hurt at all A great covered or vaulted gutter, whereby the ordures of the streets are under ground conveyed into the City ditch, passeth under the yard where-in the said Well, (dammed up since this sad accident) did stand ; so as it may be probably beleaved that that deadly infection of the air within the same Well had partly been caused through the neernes of the same

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