

the Tail. Of two sorts, the larger above, tending backward from the Spine or Back-bones. The other, from the extremities of the former, tending forward, as in the Breasts of Fowls: being with the same sort of those in Fowls, which by *Aquapendent* are called *Costulae*.

There is a kind of Diaphragm, a thin transparent Membran, as in Birds, separating a small portion, about the fourth part of the Cavity, next the Belly, from the rest. Wherein is contained a small Ventricle, connexed to the *Gula*: to which is continued an Intestine, having some little convolution in the conveyance of it; which extended might be about the length of the whole Body, with Head and Tail. The Excrements therein black, or of a sad *French Green*.

She had a small thin Liver contiguous to the upper part of the Diaphragm: in part divided into two Lobes, of a blackish or very sad colour.

The Lungs seemed to be made of Membranous cells or divisions, very thin and transparent, resembling a little light froth.

The Heart was firm and fleshy, but very small; and at the very fore end of all the Breast or Body.

At the hinder end of the Body was a double Ovary, consisting of five or six eggs (of the bigness of the Greatest-pins heads, and sticking to the Back) on each side: of the same colour and consistence with those of the Yolk of an Egg.

An Account of the Iron-Works in the Forest of Dean, communicated by Henry Powle, Esquire.

THE Forest of *Dean* (comprehending that part of *Glostershire*, that lies betwixt the Rivers of *Wye* and *Severne*) consists generally of a stiff Clay: which, according to the nature of those Soyls, is very deep and miry in the Winter, and in the Summer as dry and parched. The Country is full of Hills, but so as you may rather call it Uneven, than Mountainous, they being no where high, and rarely of a steep ascent. Betwixt them run great store of little Springs, of a more brownish colour than ordinary Waters, and often leaving in their passage tinctures of Rust. The Ground is naturally inclined to Wood, especially *Halle* and *Oak*; of which last sort it hath produced formerly most stately Timber; though now, almost totally devoured by the increase of the Iron-Works.

Upon the Surface of the Earth, in many places, lie an abundance of rough Stones, some of them of a vast bulk ; but where they sink their Mines, they rather meet with Veins of Scaly Stone, than hard and solid Rocks. Within the Forest they find great plenty of Coal and Iron-Ore ; and in some places, Red and Yellow Oker : which are all the Minerals, that are yet discovered there.

I have been the more particular in this description, because I think it not impossible, that by an exact comparing of the Nature and Productions of such Soyls, where Minerals are usually formed, we may arrive to a certain knowledge, or at least a very probable conjecture, in what places we ought to search after their several sorts, and when to desist.

The Iron-Ore, which is the principal Manufacture here, and by which most of the Inhabitants subsist, is found in great abundance in most parts of the Forest : differing both in colour, weight, and goodness. The best, which they call their Brush-Ore, is of a Blewish colour ; very ponderous, and full of little shining Specks like grains of Silver. This affords the greatest quantity of Iron ; but being melted alone produceth a Metal very short and brittle, and therefore not so fit for common use.

To remedy this Inconveniency, they make use of another sort of Material, which they call their Cynder, and is nothing else, but the Refuse of the Ore after the Metal hath been extracted ; which being mingled with the other in a due quantity, gives it that excellent temper of Toughness, for which this Iron is preferred before any that is brought from Foreign parts.

But to understand this rightly, it is to be noted, That in former times, when their Works were few, and their Vent small, they made use of no other Bellows, but such as were moved by the Strength of men : by reason whereof their Fires were much less intense, than in the Furnaces they now employ. So that having in them melted down only the principal part of the Ore ; they rejected the rest as useless, and not worth their charge. This they call their Cynder, which is now found in an unexhaustible quantity through all parts of the Countrey, where any former Works have stood.

After they have provided their Ore, their first work is to Calcine it : which is done in Kilns, much after the fashion of our ordinary Lime-Kilns. These they fill up to the top with Coal

Coal and Ore, *stratum super stratum*, until it be full ; and so putting Fire to the bottom, they let it burn till the Coal be wasted, and then renew the Kilns with fresh Ore and Coal, in the same manner as before. This is done without Fusion of the Metal, and serves to consume the more drossy parts of the Ore, and to make it friable ; supplying the Beating and Washing, which are used to other Metals.

From hence they carry it to their Furnaces, which are built of Brick or Stone, about 24 foot square on the outside, and near 30 foot in height. Within, not above 8 or 10 foot over, where it is widest, which is about the middle; the top and bottom having a narrower compass, much like the shape of an Egg, as in the Figure. See Fig. 4. A the Tunnel, C the Furnace, B the Mouth of the Furnace.

Behind the Furnace are placed two huge pair of Bellows, whose Noses meet at a little hole near the bottom. These are compressed together by certain Buttons, placed on the Axis of a very large Wheel, which is turn'd about by Water, in the manner of an Overshot-Mill. As soon as these Buttons are slid off, the Bellows are raised again by the counterpoise of weights; whereby they are made to play alternately, the one giving its blast all the time the other is rising.

At first, they fill these Furnaces with Ore and Cynder intermixt with Fuel, which in these Works is always of Charcoal ; laying them hollow at the bottom, that they may more easily take fire : But after they are once kindled, the Materials run together into a hard cake or lump, which is sustained by the fashion of the Furnace, and through this the Metal, as it melts, trickles down into the Receivers, which are placed at the bottom, where there is passage open, by which they take away the Scum and Dross, and let out the Metal as they see occasion.

Before the Mouth of the Furnace lies a great Bed of Sand, wherein they make Furrows of the fashion into which they desire to cast their Iron. Into these, when their Receivers are full, they let in their Metal ; which is made so very fluid by the violence of the Fire, that it not only runs to a considerable distance ; but stands afterwards boiling for a good while.

After these Furnaces are once at Work, they keep them constantly employed for many Months together, never suffering the Fire to slacken night nor day ; but still supplying the

the waste of the Fuel and other Materials with fresh, poured in at the top.

Several attempts have been made to bring in the use of Sea-coal in these Works, instead of Charcoal; the former being to be had at an easie rate, the latter, not without great expence: but hitherto they have proved ineffectual. The Workmen finding by experience, that a Sea-coal Fire, how vehement soever, will not penetrate the most fix'd parts of the Ore, and so leaveth much of the Metal unmelted.

From these Furnaces, they bring their Sows and Pigs of Iron (as they call them) to their Forges. These are of two sorts, though standing together under the same Roof: one they call their Finery, the other, the Chafery. Both of them are open Hearths, on which they place great heaps of Sea-coal, and behind them, Bellows, like to those of the Furnaces, but nothing near so large. Into the Finery, they first put their Pigs of Iron, placing three or four of them together behind the fire, with a little of one end thrust into it. Where softening, by degrees they stir and work them with long Bars of Iron, till the Metal runs together into a round Mass or Lump, which they call a Half-Bloom. This they take out, and giving it a few strokes with their Sledges, they carry it to a great weighty Hammer, raised likewise by the motion of a Water-wheel: where applying it dexterously to the blows, they presently beat it out into a thick short square. This they put into the Finery again, and heating it red hot, they work it out under the same Hammer, till it comes into the shape of a Bar in the middle, with two square knobs in the ends. Last of all, they give it other Heatings in the Chafery, and more workings under the Hammer, till they have brought their Iron into Bars of several shapes and sizes; in which fashion they expose them to Sale.

All their Principal Iron undergoes all the forementioned preparations: yet for several purposes, as for the Backs of Chimneys, Hearths of Ovens, and the like, they have a sort of Cast-Iron; which they take out of the Receivers of the Furnace, so soon as it is melted, in great Ladles, and pour it into Moulds of fine Sand: in like manner as they cast Brass and other softer Metals: but this sort of Iron is so very brittle, that being heated, with one blow of a Hammer it breaks all to pieces.

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Though this fault be most found in this sort of Iron; yet, if in the working of their Best sort they omit any one Process, it will be sure to want some part of its Toughness, which they esteem its perfection.

A Relation of the making of Cerufs, by Sir Philiberto Vernatti.

First Pigs of clean and soft Lead are cast into thin Plates a yard long, six inches broad, and to the thickness of the back of a Knife. These are rolled, with some Art, round; but so as the Surfaces no where meet to touch: for where they do no *Ceruff* grows.

Thus roll'd, they are put each in a Pot just capable to hold one, upheld by a little Bar from the bottom, that it come not to touch the Vinegar, which is put into each Pot, to effect the conversion.

Next a square Bed is made of new Horse-dung, so big as to hold 20 Pots abreast, and so to make up the number of 400 in one Bed.

Then each Pot is covered with a Plate of Lead; and lastly all with Boards, as close as conveniently can be. This repeated four times, makes one heap, so called, containing 1600 Pots.

After three Weeks the Pots are taken up, the Plates unrolled, laid upon a Board, and beaten with Battle-dores till all the Flakes come off. Which, if good, prove thick, hard and weighty: if otherwise, fussy and light; or sometimes black and burn'd, if the Dung prove not well order'd: and sometimes there will be none.

From the Beating-Table the Flakes are carried to the Mill; and with Water ground between Millstones, until they be brought to almost an palpable fineness. After which it is moulded into smaller parcels, and exposed to the Sun to dry till it be hard and so fit for use.

The Accidents to the Work are,

That two Pots alike ordered, and set one by the other, without any possible distinction of advantage, shall yield, the one thick and good Flakes, the other few, and small or none: which happeneth in greater quantities, even over whole Beds sometimes.

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