ſeurely, and ſomewhat enigmatically, respecting his theory, waiting for encouragement to make the obſervations which are necessary for completing it. He has, in the mean time, accompanied his account of the theory with a chart, in the form of gussets, for covering a globe of 15 inches diameter, objecting very justly to the great distortion which Wright’s charts occasion in every part near the poles. This distortion is ſuch as totally to change the appearance of the curves in thoſe very places where their appearance and magnitude are of the greatest moment.

Mr Churchman has alſo accompanied his work with the returns which he has received from ſeveral perſons eminent for their rank or learning, to whom he had applied for en­couragement and assistance. They are polite, but, we think, not so encouraging as ſuch zeal in ſuch a cauſe had good reaſon to expect. We acknowledge that there are circumstances which justify caution in promises of this nature. His profers are very great, and not qualified with any doubt. Some of his proofs are not very convincing, and there are some considerable defeats in the ſcientific part. He ſpeaks in ſuch terms of the magnetic influences as plainly lead us to conclude that they reſemble, in effect at least, the ordinary actions of magnets. He ſpeaks of the influence of one pole being greater than that of the other ; and says, that in this case the magnetic equator, where the needle will be paral­lel to the axis, will not be in the middle between the poles. This is true of a common magnet. He must therefore abide by this supposition in its other conſequences. The magnetic meridians must be planes passing through this axis, and therefore must be circles on the surface of the earth. This is incompatible with the obſervations ; nay, his charts are ſo in many places, particularly in the Pacific Ocean, where the variations by his chart are three times greater than what has been obſerved.—His parallels of dip are still more different from obſervation, and are incompa­tible with any phenomena that could be produced by a mag­net having but two poles. His rules of computation are exceedingly exceptionable. He has in fact but one example, and that ſo particular, that the mode of computation will not apply to any other. This circumstance is not taken notice of in the enunciation of his first problem ; and the reader is made to imagine that he has got a rule for com­puting the variation, whereas all the rules of calculation are only running in a circle. The variation computed for the port of St Peter and Paul in Kamtfchatka, by the rule, is ten times greater than the truth. This is like the artifice of a book-maker. We do not meet with any addition to our knowledge on the subject. The author ſeems to know something of Euler’s merit ; but instead of proſecuting the ſubject in his way, he gives us an uninteresting account of the ſurmiſes of a number of obſcure writers about the dif­ficulty of the talk ; and we think that Mr Churchman has left us as much in the dark as ever. The obſervation of the connection of the polarity of the needle with the aurora borealis occurred to the writer of this article as early as 1759, when a midſhipman on board the Royal William in the River St Laurence. Some of the gentlemen of the quarter-deck are still alive, and may remember this circumstance being pointed out to them one evening, when at an­chor off the Iſle aux Coudres, during a very brilliant aurora borealis. The point of the heavens to which all the rays of light converged was preciſely that which was oppoſite to the ſouth end of the dipping-needle. The obſervation was inſerted in the St James’s Chronicle, and afterwards (about 1776) in the London Chronicle, with a request to navigators to take notice of it, and communicate their obſerva­tions.

For our own part, we have little hopes of this problem ever being ſubjected to accurate calculation. We believe, indeed, that there is a coſmical change going on in the earth, which will produce a progressive change in the variation of the needle ; and we see none more likely than Dr Halley’s notion. There is nothing repugnant to our knowledge of the univerſe on the ſupposition of a magnetic nucleus revol­ving within this earth ; and it is very easy to conceive a very simple motion of revolution, which ſhall produce the very motion of the ſensible poles which Mr Churchman contends for. We need only ſuppoſe that the magnetical axis of this nucleus is not its axis of revolution. It may not even bisect that axis ; and this circumstance will cauſe the two poles to have different degrees of motion in relation to the ſhell which ſurrounds it.

But this regular progreſs of the magnet within the earth may produce very irregular motions of the compaſs needle, by the intervention of a third body ſuſceptible of magnetiſm. The theory of which we have just given a hint comes here to our assistance. Suppose NS (fig. 3.) to repreſent the primitive magnet in the earth, and *ns* to be a stratum of iron-ore ſuſceptible of magnetism. Alſo let *n's'* be ano­ther small maſs of a similar ore ; and let their situations and magnitudes be ſuch as is exhibited in the figure. The fact will be, that *n* will be the north pole and s the ſouth pole of the great stratum, and n' and s' will be the north and ſouth poles of the small maſs or loadstone. Any perſon may re­move all doubts as to this, by making the experiment with a magnet NS, a piece of iron or ſoft tempered steel *ns,* and another piece n'*s'.* The well informed and attentive reader will easily see, that by ſuch interventions every conceivable anomaly may be produced. While the great magnet makes a revolution in any direction, the needle will change its position gradually, and with a certain regularity ; but it will depend entirely on the size, ſhape, and situation, of theſe intervening masses of magnetiſable iron-ore, whether the change of variation of the compaſs ſhall be ſuch as the pri­mitive magnet alone would have produced, or whether it ſhall be of a kind wholly different.

Now, that ſuch intervening disturbances *may* exist, is past contradiction. We know that even on the film of earth which we inhabit, and with which only we are acquainted, there are extensive strata or otherwise diſpoſed masses of iron-ores in a state ſuſceptible of magnetiſm ; and ex­periments made on bars of hard tempered steel, and on bits of ſuch ores, assure us that the magnetiſm is not induced on ſuch bodies in a moment, but propagated gradually along the maſs.—That ſuch disturbances do actually exist, we have many relations. There are many instances on record of very extensive magnetic rocks, which affect the needle to very considerable distances. The iſland of Elbe in the Mediterranean is a very remarkable instance of this. The Iſland of Cannay alſo, on the west *of* Scotland, has rocks which affect the needle at a great distance.

A similar effect is obſerved near the Feroe Iſlands in the North Sea; the compaſs has no determined direction when brought on ſhore. J*ourn des Sçavans,* 1679, p. 174.

In Hudſon’s Straits, in latitude 63°, the needle has hardly any polarity. *Ellis's Voyage to Hudson's Bay.*

Bouguer obſerved the same thing in Peru. Nay, we believe that almost all rocks, eſpecially of whin or trappe stone, contain iron in a proper state.

All this refers only to the thin crust through which the human eye has occasionally penetrated. Of what may be below we are ignorant ; but when we see appearances which tally ſo remarkably with what would be the effects of great masses of magnetical bodies, modifying the general and re­gularly progressive action of a primitive magnet, whoſe existence and motion is inconsistent with nothing that we know