The following Addreſs having been read to this Royal Society, the Preſident and Council of the ſame, being deſirous to encourage, as much as may be, an Undertaking ſo uſeful, deſire the ſeveral Members thereof, and their learned and ingenious Correſpondents, to communicate their Obſervations, directed to their Secretaries, in Crane-Court, Fleet-Street.

CVII. *An Attempt to point out, in a conciſe manner, the Advantages which will accrue from a periodic Review of the Variation of the magnetic Needle, throughout the known World; addreſſed to this Royal Society by* William Mountaine *and* James Dodſon, *Fellows of the ſaid Society, and requeſting their Contribution thereto, by communicating ſuch Obſervations concerning it, as they have lately made, or can procure from their Correſpondents in foreign Parts.*

London, March 20, 1755.

Read March 20, 1755.

ABOUT the year 1700, the juſtly celebrated Doctor Edmund Halley having collected together a great number of obſervations, made on the variation of the needle, in many parts of the world, drew (on a mercator CHART) certain lines, ſhewing the quantity of that variation, in thoſe parts of the world, over the repreſentation of which thoſe lines were drawn; but as the quantity

of this variation is in a perpetual ſtate of fluctuation, in (perhaps) every part of the world, it had been ſo much changed in the ſpace of forty years, or thereabouts, that (when the writers of this paper endeavoured about the year 1744, to draw thereon, other lines to anſwer the purpoſes above-mentioned) they found that thoſe laid down by Doctor Halley were grown intirely uſeleſs; and that a ſyſtem of ſuch lines, or ſomething analogous thereto, ſhould be performed once in every ten or twelve years at leaſt, in order to anſwer the purpoſes intended, by that ſagacious gentleman.

In the reconſtruction of them, the writers received the aſſiſtance of the commiſſioners of the navy, and of the directors of the Eaſt-India and African companies, having leave to peruſe the journals of thoſe mariners, which were under the direction of each reſpective body; From theſe, and a few private communications, they were enabled to draw the proper lines over the moſt frequented ſeas, and to make ſome attempts toward doing the ſame in thoſe leaſt ſo; A copy of the CHART, thus again rendered uſeful, they preſented to this Royal Society, with an account of the methods uſed in performing the ſame.

Although the moſt beneficial uſe of theſe lines belongs to the ſea, yet if they could be extended over the land likewiſe, the advantages ariſing would more than compenſate the trouble, as will appear by taking a ſhort view of each.

And firſt, the uſe of theſe lines at ſea may be conſidered either as common to the art of navigating in all large bodies of water; or as particular in ſome ſuch: the general uſe being that of ſteering the true courſe

courſe deſigned, and finding the ſhip's true place, as near as may be, by what the mariners call the dead-reckoning.

The particular uſes will be beſt explained by examples; for inſtance, in the ſouthern parts of the great Atlantic ocean, beginning with the coaſt of Brazil and Patagonia, and proceeding to the ſouth of the Cape of Good Hope into the Indian ocean, as far as the common tracks of our Eaſt-India ſhips extend, the variation lines have appeared to be, for the moſt part, directed northward and ſouthward; whence, in moſt places of that great body of waters, if the latitude and variation be found by celeſtial obſervations, the longitude will be obtained by the lines on the chart; the great uſefulneſs of which has been atteſted to the writers, by many perſons who have, ſucceſsfully to themſelves, practically applied the laſt conſtructed CHART, to correct their dead-reckoning on that long paſſage.

Indeed, where the variation lines run nearly eaſtward and weſtward, as has appeared in the Atlantic ocean, from the weſt coaſt of Europe to the eaſt coaſt of North America, no aſſiſtance toward obtaining the longitude can be derived from them; but as it frequently happens, within thoſe limits, that meridian obſervations, for determining the latitude, cannot be obtained, eſpecially about Newfoundland; then, if a good obſervation of the variation can be taken, at any time of the day the latitude may be nearly aſcertained by the lines on the CHART.

Secondly, The advantage that will ariſe by extending the variation lines over the land, as well as ſea, will be the confirmation of thoſe drawn over the waters;

waters; the continuation of which, from ſea to ſea, will be thereby conſpicuous, and we ſhall be enabled to judge better of their nature, properties and cauſes; and, if the ſame can be extended over all the parts of the known world, the eye will be preſented, at one view, with the different degrees of attraction, with which all the parts of this great magnet are endued, at the time when ſuch lines are drawn; This the writers would have attempted to have done, in the year 1744, if they could have procured a ſufficient number of obſervations for that purpoſe; but although they frequently advertiſed their requeſt, in the public papers, no aſſiſtance was thereby obtained.

As the writers have by experience found, that the proper period for re-examining the ſtate of the variation is now at hand, without which the above-mentioned valuable advantages of the CHART will be loſt to the mariner; they have determined to collect and compare all the obſervations that can be procured by them, in the ſpace of a year from this time, or ſo long after as the return of the Eaſt-India ſhips then next following; if ſuch delay ſhould become neceſſary, by the ariſing of any doubt in conſequence of ſuch compariſon; and then to publiſh the reſult of their proceſs, in ſuch a manner as ſhall ſeem moſt convenient.

Several of the learned and ingenious have endeavoured to account for this phænomenon of the variation of the magnetic-needle, and the continual mutation thereof; whence different methods of computation have been propoſed, whereby they have endeavoured to determine what the quantity of the

variation will (according to their ſeveral hypotheſes) be at any given place and time: The above propoſition, therefore, will (if carried into execution) bring theſe ſeverally to the teſt, and enable the judicious either to approve or reject them; the writers being determined (as was their former plan) to publiſh nothing which ſhall not be warranted by the real obſervations, which ſhall come into their hands, and ſhall leave the application thereof (as to each hypotheſis) to others: if any of them ſhould be ſo far confirmed, by this examination and compariſon, as to give juſt ground for a calculation, their labour will be at an end; but if not, they humbly recommend the continuance of ſuch a periodic operation, as they now propoſe to undertake, being the only means of attaining ſuch a deſirable event, and of ſupplying the defect till it can be obtained.

To whom then can they ſo properly apply, as to the Royal Society of London, for aſſiſtance, in a work of ſo much conſequence to trade and navigation, and from whence ſo valuable an addition to natural knowledge may poſſibly accrue: It has been the peculiar honour of the many illuſtrious members of this body, that they have deduced their knowlege from experiments, and not from hypotheſes; and (as that is the method now propoſed) the writers of this paper humbly deſire of this Society, as a body, and of each individual that compoſes it, to communicate to them ſuch obſervations of the variation as they have already made within a few years laſt paſt, or ſhall hereafter make, before the 25th of March 1756, either by ſea or land; and (as all mankind

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are equally intereſted in this reſearch) that they will endeavour to procure the like favour from their ſeveral correſpondents in foreign countries: They beg leave to aſſure the Society, and its particular members, that they ſhall receive a grateful acknowlegement of this favour, granted; and an early information of any thing relating hereto, which the writers ſhall conceive to be worthy their attention.

The END of VOL. XLVIII.

Additions