

son upon its consequences? True. But you must commence with acknowledging, that the deluge could not possibly be the effect of any physical cause; you must regard it as an immediate operation of the Deity; you must content yourself with what is recorded in scripture; and you must, above all, avoid blending bad philosophy with the purity of divine truth. After taking these precautions, which a respect for the counsels of the Almighty requires, what remains for examination upon the subject of the deluge? Do the sacred writings tell us that the mountains were formed by the deluge? They tell us the reverse. Do they inform us that the agitation of the waters was so great, as to raise the shells from the bottom of the ocean, and to disperse them over the face of the earth? No: The ark moved gently on the surface of the waters. Do they tell us, that the earth suffered a total dissolution? By no means. The narration of the sacred historian is simple and true; that of naturalists is complicated and fabulous.

## P R O O F S

OF THE

### THEORY OF THE EARTH.

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#### ARTICLE VI.

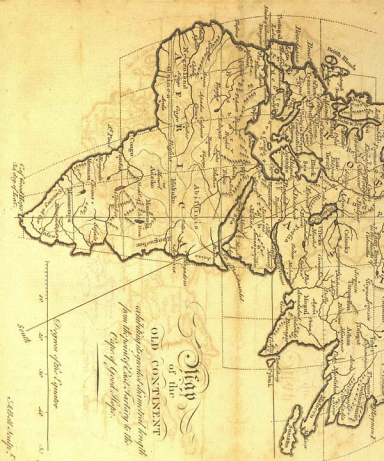
##### *Geography.*

THE surface of the earth is not, like that of Jupiter, divided into alternate bands or belts, parallel to the equator. On the contrary, it is divided, from one pole to the other, into two belts of earth, and two of sea. The first and principal belt is the ancient Continent, the greatest length of which is a line commencing at the most eastern point of the north of Tartary, and extending from thence to the neighbourhood of the gulf of Linchidolin, where the Russians fish whales; from thence to Tobolski; from Tobolski to the Caspian sea; from the Caspian sea to Mecca; from Mecca to the western part of the country inhabited by the Galli in

Africa; from thence to Monoemuci, or Monomotapa; and, lastly, to the Cape of Good Hope. This line is about 3600 leagues in length, and is never interrupted but by the Caspian and the Red Seas, the breadth of which is inconsiderable, and ought not to be regarded, especially as, like our seasons, the whole surface of the globe is divided into four parts only.

This greatest length of the Old Continent lies in a diagonal line; for, if measured by a meridian, it will appear, that, from the northernmost point of Lapland to the Cape of Good Hope, exceeds not 2500 leagues; and that this line, though shorter, meets with greater interruptions from the Baltic and Mediterranean. With regard to all other lines which could be drawn under the same meridians in the Old Continent, they must still be shorter than those we have mentioned. For example, from the most southern point of the Island of Ceylon to the northernmost coast of Nova Zembla, is 1800 leagues. In the same manner, if the Continent be measured by lines parallel to the equator, its greatest length, without much interruption by seas, will stretch from Trefana, on the west coast of Africa, to Nipno, on the east coast of China, which is about 2800 leagues. Another line may begin near Brest, and extend to the coast of Chinese Tartary, which will be nearly 2300 leagues. From Bergen in Norway, to the coast of Kamtschatka, is only 1800 leagues. All these lines

are





are much shorter than the first. Hence the greatest length of the Old Continent extends from the eastern point of Tartary to the Cape of Good Hope, and is about 3600 leagues. See *plate L*.

This line may be considered as the middle of the ancient Continent; for, in measuring the surface on each side of it, I find, that on the left, there are  $2,471,092\frac{1}{4}$  square leagues; and, on the right, there are 2,469,687, which is an equality so astonishing, as to render it extremely probable that this line, which is the longest, at the same time really divides the contents of the ancient Continent.

Hence the Old Continent consists of about 4,940,780 square leagues, which is a fifth part of the surface of the globe, and may be regarded as a large belt of earth, with an inclination to the equator of about 30 degrees.

The New Continent is another belt of earth, the greatest length of which may be taken from the mouth of the river Plata to the lake of the Assiniboils. This line passes from the mouth of the river Plata to Lake Caracara; from thence to Mataguais, Pocona, Zongo, Mariana, Morua, St. Fe, and Carthagena; then it passes through the gulf of Mexico to Jamaica and Cuba; from thence along the peninsula of Florida, through Apalache, Chicachas; and from thence to St. Louis, Fort le Sueur, and terminates in the country bordering on Lake Assiniboils,

boils, the extent of which is unknown. See plate II.

This line is interrupted only by the Gulf of Mexico, (which may be considered as a Mediterranean sea,) is about 2500 leagues in length, and divides the New Continent nearly into two equal parts, that on the left containing 1,069,286 $\frac{1}{2}$  leagues square, and that on the right 1,070,926 $\frac{1}{2}$ . It is the middle of the belt of land called the New Continent, and is likewise inclined to the equator about 30 degrees, but in an opposite direction; for that of the Old Continent extends from the north-east to the south-west; but that of the New Continent from north-west to south-east. The superficial contents of the Old and New Continents are about 7,080,993 square leagues, not near a third part of the surface of the globe, which contains 23,000,000 square leagues.

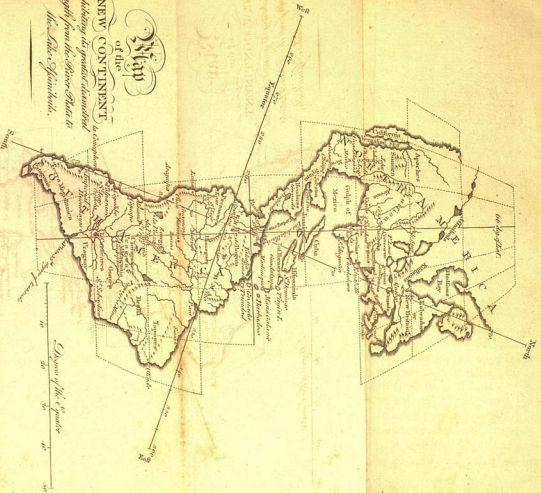
Of these lines, which divide the Continents into two equal parts, it may be remarked, that they both terminate at the same degrees of north and south latitude; and that the two Continents make mutual advances, or projections, exactly opposite to each other, namely, those on the African coast, from the Canary Isles to Guiney; and those of America, from Guiana to the mouth of the Rio-Janeiro.

It is, therefore, apparent, that the most ancient lands on the globe are those which extend from 200 to 250 leagues on each side of the two lines above



Plate II.

Plate II.





above described. Agreeable to this idea, which is founded on the observations already made, we find that, in the Old Continent, the most ancient countries of Africa are those which stretch from the Cape of Good Hope to the Red Sea and Egypt, and are about 500 leagues broad; and, consequently, that the whole western coast of Africa, from Guiney to the Straits of Gibraltar, are new lands. In the same manner, if we trace this line through Asia, and include an equal breadth, we shall find, that the most ancient countries are, the two Arabia's, Persia, Georgia, Turcomania, a part of Independent Tartary, Circassia, part of Muscovy, &c.; and, of course, that Europe, and perhaps also China, and the eastern part of Tartary, are comparatively new countries.

In the New Continent, we shall likewise find, that Terra Magellanica, the eastern part of Brasil, of the country of the Amazons, of Guiana, and of Canada, are new lands, when compared with Tucuman, Peru, Terra Firma, the islands in the Gulf of Mexico, Florida, the Mississippi, and Mexico. To these observations may be added two remarkable facts. The Old and New Continents are nearly opposite to each other. The Old Continent extends farther north of the equator than south; but the New, farther south than north. The centre of the Old Continent lies in the 16th or 18th degree of north latitude; and the centre of the New Continent lies in the

16th or 18th degree of south latitude, as if they were intended to counterbalance each other. There is another singular analogy between the two Continents, though it appears to be chiefly the effect of accident. Both Continents might be divided into two portions, which would be surrounded on all sides by the sea, except the two small isthmus's of Suez and Panama.

These general observations on the division of the globe are the result of an attentive survey. We shall not, upon this foundation, erect hypotheses, or indulge in reasonings, which might lead to false conclusions. But, as the division of the globe has not hitherto been considered under this point of view, I shall hazard a few remarks. It is not a little singular, that the longest line which can be drawn upon the two Continents should, at the same time, divide them into two equal parts. It is not less remarkable, that these two lines should commence and terminate at the same degrees of latitude, and have the same inclination to the equator. These relations may lead to general conclusions, of which we are still ignorant. We shall afterwards examine, in detail, the inequalities in the figure of the two Continents, and shall here only remark, that the most ancient countries should be found in the neighbourhood of the above lines, and should, at the same time, have the highest elevation; and that the more recent lands should be

be most remote from these lines, and likewise lie lower. Agreeable to this idea, the newest countries in America should be the land of the Amazons, Guiana, and Canada. In examining the map of these countries, we perceive that they are every where divided by numberless lakes and rivers, which is a still stronger indication of their recent origin. On the other hand, the regions of Tucuman, Peru and Mexico, are high mountains, and situated near the line that divides the continent; circumstances which seem to prove the superior antiquity of these countries. Africa is also extremely mountainous, and at the same time very ancient. In this part of the globe, Egypt, Barbary, and the western coast, as far as Senegal, can only be considered as new lands. Asia is perhaps the most ancient of all countries, especially Arabia, Persia, and Tartary. But the inequalities of this great division of the globe, as well as those of Europe, shall be treated of in a separate article. We shall only remark, in general, that Europe is a new country, as appears from those universal traditions concerning migrations of different nations, and the origin of arts and sciences. It is not long since Europe was full of marshes and forests. But, in countries anciently inhabited, there are few woods, lakes, or marshes, but a great deal of heath and shrubs, and many high mountains, with dry and barren tops; for men destroy woods, drain marshes and lakes, and, in process



process of time, give an appearance to the face of the earth totally different from that of uninhabited or newly-peopled countries.

A small portion of the globe only was known to the ancients. The whole of America, the Arctic Circle, Terra Australis and Magellanica, and a great part of the interior regions of Africa, were unknown to them. They knew not that the Torrid Zone was inhabited, although they had sailed round Africa. About 2200 years ago, Neco King of Egypt furnished some vessels to the Phœnicians, who sailed down the Red Sea, doubled the Cape of Good Hope, and the third year after their departure they entered the Mediterranean by the straits of Gibraltar\*. The ancients, notwithstanding, were totally ignorant of the polarity of the loadstone, although they knew its power of attracting iron; they knew not the cause of the tides; and they were uncertain whether the ocean surrounded the globe. Some of them, indeed, suspected that it might be so; but these conjectures were so ill founded, that none of them ever dreamed of its being possible to circumnavigate the earth. Magellan, in the year 1519, was the first who attempted this great voyage; and he accomplished it in 1124 days. Francis Drake, in the year 1577, was the second; and he performed it in 1056 days. Thomas Cavendish set out upon this voyage in 1586, and finished it in 777 days.

\* See Herodotus, lib. 4.

These

These celebrated navigators were the first who gave a physical demonstration of the sphericity and extent of the circumference of the earth. The ancients, though they travelled much, had no adequate idea of the extent of the globe. They were equally ignorant of the trade-winds, which are so useful in long voyages. Their limited knowledge in geography, therefore, should not surprise us, especially when it is considered, that, notwithstanding the advantages derived from the mathematical sciences, and from the discoveries of navigators, many points remain still undetermined, and vast regions are yet undiscovered. Of the countries in the neighbourhood of the south pole, we only know that they exist, and that they are separated from the other continents by the ocean\*. Much, likewise, remains to be discovered concerning the lands near the north pole: And it is a subject of regret, that, for a century past, the ardour for discovering new countries has greatly abated. The nations of Europe seem, and perhaps they are right, more disposed to increase the value of those countries they have already discovered, than to acquire new territories.

The discovery, however, of the Southern Continent would be a grand object of curiosity, and might be attended with the greatest advantages. A few of its coasts have been recognised; but those navigators, who have attempted

\* Captain Cooke, in his late voyage, has demonstrated, in the completest manner, that no continent exists near the south pole.  
this

this discovery, have always been prevented from reaching land by large bodies of ice. The thick fogs which infest those seas form another obstacle. But, notwithstanding all these inconveniences, it is probable, that, by setting out from the Cape of Good Hope at different seasons, part of this new world might still be discovered.

Another method might, perhaps, be attended with more success. To avoid the fogs and the ice, the discovery might be attempted, by departing from Baldivia, or some other port on the coast of Chili, and traversing the south sea under the 50th degree of south latitude. This navigation appears not to be hazardous; and it is probable that it would be attended with the discovery of new lands; for the regions about the south pole, still unknown, are so extensive, that they may be computed to be about a fourth part of the globe; and, consequently, may contain a country as large as the whole of Europe, Asia, and Africa.

While we remain ignorant of this part of the earth, we cannot determine the proportion the surface of the land bears to that of the ocean; from what we do know, it appears that there is more sea than land.

To acquire an idea of the vast quantity of water in the ocean, we must suppose a medium depth, for example, that of 200 fathoms, or the sixth part of a league. Upon this supposition, there is as much water in the ocean as would be sufficient

sufficient to cover the whole globe to the depth of 600 feet; or, if collected into one mass, it would form a globe of 60 leagues in diameter.

It is alleged by navigators, that the latitudes near the south pole are much colder than the same latitudes towards the north. But this opinion seems to have no foundation. It appears to have been adopted from the circumstance of ice appearing in latitudes where none is found in the northern seas. But this effect may be owing to some peculiar causes. After the month of April, there is no ice on this side of 67 or 68 degrees of north latitude; and the savages of Acadia and of Canada say, that if the ice be not melted in April, it indicates a cold and rainy summer. The year 1725 was distinguished by an almost perpetual rain; and, in April, the ice in the northern seas was not only not melted at the 67th degree, but, on the 15th of June, it was found in lat. 41 or 42°.

Great quantities of floating ice appear in the north seas, especially at considerable distances from land. They come from the Tartarean sea, into that of Nova Zembla and other parts of the Frozen Ocean. I have been assured, by people worthy of credit, that an English Captain, called Manson, instead of searching for a passage to China between the northern lands, directed his course straight to the pole till he arrived within two degrees of it; and that, in this course, he

\* See l'Hist. de l'Acad. année 1727.

found

found an open sea, and no ice; which is a clear proof that the ice is always formed near the land, and never in an extensive sea: For, though it should be supposed, contrary to probability, that the cold was so intense at the pole as to freeze the surface of the sea, it is still inconceivable how these enormous floating masses could be formed, without being attached to the land, from which they are again separated by the heat of the sun. Two vessels sent by the East India Company, in 1739, to discover land in the south seas, found boards of ice in lat. 47 or 48; but they were not very distant from the shore, which was in view, though the vessels could not make their landing good\*. These boards of ice must have been detached from the lands in the neighbourhood of the south pole; and it may be conjectured that they follow the course of some large rivers in these unknown regions, in the same manner as the Oby, the Jenisca, and other great rivers that fall into the north seas, carry down boards of ice, which shut up, during the greatest part of the year, the straits of Waigat, and render the sea of Tartary, by this course, altogether inaccessible; while, beyond Nova Zembla, and nearer the pole, where there is little land and few rivers, boards of ice are less frequent, and the sea is more navigable. Hence, if any farther attempts be made to find a passage to China and Japan by the north seas,

\* See on this subject a chart by M. Bauche, 1739.

it

it will, perhaps, be necessary to keep at a distance from the land and the ice, to steer directly towards the pole, and to explore the most open seas, where unquestionably there is little or no ice: For it is well known, that salt water can take on a greater degree of cold, without freezing, than fresh water after it is congealed; consequently, the excessive cold at the pole may render the sea colder than ice, without freezing its surface. Besides, at 80 or 82 degrees, the sea, though mixed with snow and fresh water, is never frozen, except near the coasts. From the united testimony of several navigators, it is apparent, that there is a passage from Europe to China by the north sea: The reason why it has so often been in vain attempted is obvious. Fear prevented the undertakers from keeping at a sufficient distance from the land, and from approaching the pole, which they probably imagined to be an immense rock.

William Barents, however, who, like many others, had run aground in his voyage, never doubted the existence of such a passage, or that, if he had kept farther from land, he would have found an open sea without ice. The Russian navigators sent by the Czar to reconnoitre the north sea, relate, that Nova Zembla is not an island, but a part of Tartary, and that, to the north of it, there is a free and open sea. A Dutch voyager affirms, that whales are occasionally thrown upon the coasts of Corea and of Japan,

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Japan, with European harpoons sticking in their backs. Another Hollander alleges, that he had penetrated to the pole itself, and assures us, that it was as warm as at Amsterdam in summer. One Goulden, an Englishman, who had made above thirty voyages to Greenland, related to Charles II. that two Dutchmen, who sailed along with him, having been unsuccessful in fishing off the coast of the Isle of Edges, resolved to proceed northward; that, upon their return, fifteen days after, they told him, that they had been at the 89th degree of latitude, where they found no ice, but an open, deep sea, like that in the Bay of Biscay; and that they showed him the two ships journals in support of what they advanced. In fine, it is related in the Philosophical Transactions, that two navigators, who engaged in the discovery of this passage, penetrated 300 leagues to the east of Nova Zembla; but, on their arrival, the East India Company, who thought they had an interest in preventing the discovery, allowed them not to return that way to Europe\*. But the Dutch East India Company, who believed themselves interested in the discovery, having made unsuccessful attempts on the European side, tried to find it by the way of Japan; and they would probably have succeeded, if the Emperor of China had not prohibited all strangers from navigating on the coasts of the lands of Jessô. This passage, there-

\* See Collect. of Voyages to the North, p. 200.

fore, cannot be found but by steering directly to the pole beyond Spitzbergen, or rather by keeping the open sea between Nova Zembla and Spitzbergen, under the 79th degree of latitude. For the reasons already given, there is no occasion to dread ice, even under the pole itself; for there is no example of a large sea freezing at a great distance from land. The only sea that freezes totally is the Black Sea, which is narrow, contains little salt, and receives from the northern countries a number of rivers, and large boards of ice. If we may credit historians, this sea, in the time of the Emperor Copronymus, froze to the depth of 30 cubits. This may be an exaggeration: But that it freezes every winter is certain, while open seas, 1000 leagues nearer the pole, never do. This fact can only be explained by the superior saltness, and the comparatively small quantity of ice-boards which these seas receive.

Boards of ice, which have been regarded as invincible obstacles to navigation near the poles, prove only the existence of large rivers in the neighbourhood of the places where they appear. They also demonstrate the existence of vast continents, from which these rivers derive their sources; and, therefore, we ought not to be discouraged by their appearance: Besides, very little reflection will convince us, that these boards of ice must be confined to particular places; that it is impossible they should occupy the whole circle in which the southern continent is supposed

supposed to be contained; and, therefore, if a different route were taken, we have reason to hope for success. From the description of New Holland, given by Dampier, and others, it is probable, that this part of Terra Australis, which is, perhaps, a part of the southern continent, is a country less ancient than what remains to be discovered. New Holland lies low; it has neither mountains nor rivers; it is thinly inhabited, and the natives have no industry. All these circumstances induce us to think, that the savages of New Holland are similar to those of the Amazons, and of Paraguay, in America. In Peru and Mexico, which are the most elevated, and, of course, the most ancient countries of America, the manners of the inhabitants were polished; and they were divided into distinct nations, governed by sovereigns and by laws. Savages, on the contrary, are always found in low and new countries. Hence we may presume, that, in the elevated and interior parts of the southern continent, from which issue those large rivers that carry down boards of ice to the sea, there are men united by the bonds of society.

The interior parts of Africa are nearly as little known to us as they were to the ancients. They had circumnavigated this immense peninsula; but they have neither left us charts nor descriptions of its coasts. Pliny tells us, that this voyage was performed in the days of Alexander the Great; that the wrecks of some Spanish ships were

were found in the Arabian sea; and that Hanno, the Carthaginian General, had sailed from Gades to the Arabian gulf, and had written a relation of the voyage. He farther informs us, that, in the days of Cornelius Nepos, one Eudoxus, who had been persecuted by King Lathurus, was obliged to fly; that he departed from the Arabic gulf, and arrived at Gades; and that, previous to this period, Spain carried on a trade by sea with Æthiopia\*. But, these testimonies notwithstanding, we are of opinion, that the ancients never doubled the Cape of Good Hope: Every man considered the voyage of the Portuguese to the East Indies as a new discovery. It will not be incurious to see the sentiments entertained of this subject in the ninth century. 'In our days, a discovery has been made which was totally unknown to those who lived before us. No man believed, or could suspect, that the sea which reaches from the Indies to China, had any communication with the sea of Syria. But we have lately found, according to my information, in the Mediterranean, or sea of *Roum*, the wreck of an Arabian ship which had been flaved to pieces by a tempest. Some of these pieces had been carried, by the wind and the waves, into the sea of the Cozars; from thence round to the Mediterranean, and along that sea to the coast of Syria. This is a demonstration that the

\* See Plin. Hist. Nat. tom. i. lib. 2.



' ocean surrounds China and Cila, the extremity  
' of Turqueston, and the country of the Cozars,  
' and that, at last, it enters by the Straits, and  
' washes the borders of Syria. The evidence  
' arises from the construction of the vessel; for  
' there are no ships but those of Siraf whose  
' planks are not nailed. But the vessel above  
' mentioned had all her planks stitched together  
' in a manner peculiar to the Arabians. But  
' all vessels belonging to the Mediterranean, and  
' the coast of Syria, have their timbers fastened  
' with nails \*.

I shall subjoin the remarks added by the translator of this ancient relation:

' Abuziel remarks, as a thing perfectly new,  
' that a vessel had been carried from the Indian  
' sea, and thrown upon the coast of Syria. To  
' find a passage for it into the Mediterranean,  
' he supposes, that there is a great extent of sea  
' beyond China, which communicates with the  
' sea of the Cozars, or of Muscovia. The sea  
' beyond Cape Current was entirely unknown  
' to the Arabians, on account of the extreme  
' hazard of navigating it, and because the continent  
' was inhabited by a people so barbarous,  
' that it was impossible either to conquer them,  
' or to civilize them by commerce. The Portuguese  
' found not, from the Cape of Good  
' Hope to Sossala, any Moors who had an esta-

\* See Les anciennes relations des voyages faits par terre a la Chine, p. 53.

' blished

' lished settlement, like those in all the maritime  
' villages as far as China, which was the farthest  
' place known to geographers. But they could  
' not tell whether the Chinese sea communi-  
' cated with that of Barbary by the extremity  
' of Africa; they only described it to the coast  
' of Zinga or Caffraria. We cannot, therefore,  
' hesitate in pronouncing, that the first discovery  
' of the passage of this sea, by the Cape of Good  
' Hope, was made by the Europeans, under the  
' command of Vasco da Gama, or, at least, a  
' few years before he doubled that Cape, if we  
' may credit some sea-charts of an older date,  
' where the Cape is marked under the name of  
' *Fronteira da Africa*. Antony Galvan relates,  
' upon the testimony of Francisco de Sousa Ta-  
' vares, that, in 1528, the Infant Don Ferdi-  
' nand shewed him a similar chart from the  
' monastery of Acoboca, dated 120 years be-  
' fore, copied, perhaps, from that said to be  
' in the treasury of St Marc at Venice, on  
' which the point of Africa is likewise deline-  
' ated, according to the evidence of Ramusio,  
' &c.

The ignorance of these ages concerning the navigation round Africa is not, perhaps, so singular as the silence of the editor of this ancient relation with regard to the passages in Herodotus, Pliny, &c. which we have quoted, and which proved that the ancients had sailed round Africa.

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However



However this matter stands, the coasts of Africa are now well known. But all the attempts which have been made to penetrate into the interior parts, have not furnished us with exact accounts. It would be a great object to go far up the country, by means of the Senegal, or some other great river, and establish settlements. According to every appearance, we should there find a country as rich in precious metals as Peru or Brasil. It is well known, that the rivers of Africa abound in gold dust; and, as the country is very high and mountainous, and is, besides, situated under the equator, it unquestionably contains, as well as America, mines of the heaviest metals, and stones of the hardest and most compact texture.

The vast extent of north and east Tartary is but a late discovery. If the Russian charts be just, we know the whole coast of this part of Asia; and it appears, that, from the termination of east Tartary to North America, it is an extent not above 400 or 500 leagues. It has even been lately reduced to a much shorter space. In the Amsterdam Gazette of 24th January 1747, under the article Petersburg, it is alleged, that M. Stollerravoit had discovered, beyond Kamtschatka, one of the North American isles, and that he had demonstrated that we might sail from Russia to America by a very short passage. The Jesuits and other missionaries also pretended to have known savages in Tartary, whom they had catechized in America, which supposes the passage

to

to be indeed very short\*. Charlevoix would have us believe, that the old and new continents are united in the northern parts. He says, that some late voyages of the Japanese make it probable that the passage we have been mentioning is only a bay, beyond which we may pass, by land, from Asia to America. But this notion requires confirmation; for it has always been thought, that the continent of the North Pole is probably separated from all other continents, as well as that of the South Pole.

Astronomy and navigation have reached so high a pitch of perfection, that we may reasonably hope soon to have an exact knowledge of the whole surface of the globe. The ancients, who were ignorant of the mariner's compass, were able to discover a small part of it only. Some pretend that the Arabians invented this instrument, and that, by means of it, they carried on trade with India as far as China†. But this notion has always appeared to me to be destitute of foundation; for there is not in the Arabian, Turkish, or Persian languages, a word that signifies a mariner's compass: They use the Italian word *bussola*. Even at this moment, they can neither make compasses nor give polarity to the needle. They purchase these articles from the Europeans. Father Martini alleges, that the Chinese have been acquainted with the compass these

\* See Charlevoix, tom. iii. p. 30.

† See l'Abregé de l'Hist. des Sarazins de Bergeron, p. 119.

3000 years\*. If these facts be true, how should it happen that they have made so little use of this instrument? Why, in their voyage to Cochinchina, did they take a longer course than was necessary? Why did they always limit themselves to the same expeditions, the longest of which was to Java and Sumatra? And why did they not discover, before the Europeans, a vast variety of islands and of fertile countries in their own neighbourhood, if they possessed the art of navigating in the open seas? It was but a few years after the discovery of this wonderful quality of the loadstone, that the Portuguese doubled the Cape of Good Hope, and traversed the African and Indian oceans, and that Christopher Columbus sailed to America.

It was not difficult to conjecture, that immense regions existed in the western part of the globe; for, on computing what was known of it, namely, the distance from Spain to China, and attending to the revolution of the earth, or of the heavens, it was easy to perceive, that a greater extent lay to the west than what had been already discovered on the east. That the ancients found not the new world, was not owing to a deficiency in astronomical science, but solely to their ignorance of the compass. The passages of Plato and of Aristotle, which mention countries far beyond the Pillars of Hercules, seem to indicate that some mariners had been driven by a tempest

\* See hist. Sicily, p. 106.

on the coast of America, from which they had returned with infinite labour. But, supposing the ancients to have been thoroughly convinced, from the relations of voyagers, that such a continent existed, being ignorant of the compass, they could not possibly derive any advantage from such conviction.

I acknowledge, that it is not absolutely impossible for resolute men, with no other guide than the stars, to sail in open seas. The ancients were in possession of the Astralabe. They might take their departure from France or Spain, and sail to the west by always keeping the polar star on their right hand; and, by frequent soundings, they might keep nearly in the same latitude. It was unquestionably by keeping the pole-star on their left, that the Carthaginians mentioned by Aristotle were enabled to return from those distant regions. But it will still be allowed, that a voyage of this kind must have been regarded as a rash and hazardous enterprize. We ought not, therefore, to be surpris'd, that the ancients never conceived such a project.

Before the expedition of Columbus, the Azores, the Canaries, and Madeira, had been discovered. It had been remarked, that, when the west winds continued long to blow, the sea threw upon the coasts of these islands pieces of strange wood, canes of an unknown species, and even dead bodies, which, by several marks, were known to be neither Europeans nor Africans\*.

\* See Charlevoix, tom. i. p. 66.

Columbus himself remarked, that, on the west coasts, certain winds blew for some days, which he was persuaded proceeded from land. But, though he possessed all these advantages over the ancients, and likewise the compass, the difficulties to be encountered were so great, that nothing less than success could have justified the enterprise. Suppose, for a moment, that the continent of America had been 1000 or 1500 leagues more distant, a circumstance which Columbus could not foresee, he never would have arrived, and perhaps this vast country might still have remained undiscovered. This conjecture receives additional force, when it is considered, that Columbus, though the ablest navigator of his age, was seized with terror and astonishment in his second voyage to the New World: As, in his first voyage, he found nothing but islands, he directed his course more to the south in quest of a continent; but found himself stopped by currents, the great extent of which, and their uniform opposition to his course, obliged him to direct his search more to the west. He imagined, that it was not currents which prevented him from advancing to the south, but that the sea was rising to the heavens, and that both perhaps touched each other in the southern parts: Thus, in great undertakings, the most trifling difficulty may sometimes turn a man's brain, and extinguish his courage.

# P R O O F S

OF THE

## THEORY OF THE EARTH.

### ARTICLE VII.

*Of the Formation of Strata, or Beds, in the Earth.*

WE have demonstrated, in the first article, that the earth, in consequence of the mutual attraction between the particles of matter, and of the centrifugal force that results from its diurnal revolution, must have assumed the figure of a spheroid, the two diameters of which differ about a 230th part; and that nothing but the changes made on the earth's surface, by the motions of the air and of the waters, could augment this difference, in the manner alleged by those who measured a degree under the equator, and another within the polar circle. This figure of the earth, which agrees so well with the laws of hydrostatics and with our theory, indicates