ocean it would rain incessantly, and all but the most elevated parts of the world would be under water, and even these would be totally unproductive, while if there was much more land the world would become a desert without a human being on its surface. This is only one of the many proofs of the existence of design and at the same time wisdom in the arrangements of the great Author of Nature.—In the present article we intend simply to lay before the reader a few of the phenomena connected with the ocean, and where it is possible, explain their nature and apparent object. Of course there are innumerable objects connected with the ocean which man can never know, and here perhaps more than anywhere else is made to feel his own littleness. The bed of the basin of the sea appears to be covered either with sand and gravel or inhabited by immense quantities of testaceous animals. It is said that in some parts of the Adriatic Sea these beds are several hundred feet in thickness. Every one has heard of the celebrated diver, Piscola, employed by the Emperor Frederick II. to descend the Straits of Messina, where he saw with horror enormous polypi attached to the rocks, with arms several yards long, sufficiently strong to strangle a man. There are many places in the sea where no bottom has been discovered, and from this circumstance some have been led to assert that in these places it is bottomless.—Were the bottom of the sea laid bare, it would in all likelihood present mountains and vallies somewhat resembling the land. The highest mountains on the face of the globe exceed 30,000 feet in height; while the greatest depth that the lead has yet reached in the ocean is that found by Lord Mulgrave, who, with a very heavy lead attached to a thick cable, sounded to the depth of 4680 feet and found no bottom. But this depth was not one sixth of the height of the highest range of mountains. Coming from the bottom to the surface of the ocean, we notice that the natural level of the water is almost everywhere the same. This gives the equal pressure in every direction which the particles of a fluid exercised on each other, naturally enough produces. There are however some slight exceptions to this rule in regard to inland seas, which are generally a little higher than the main ocean. The Mediterranean is higher than the Atlantic ocean, and consequently pours part of its superfluous waters into the latter, through the Straits of Gibraltar: from the numerous rivers which flow into the Mediterranean, joined to its comparatively confined surface, it is unable to get clear of the necessary amount of water by the ordinary means of exaltation, and therefore pours its redundant stock into the mighty Atlantic.

The liquid substance of which the sea is composed has long been a subject of curious investigation by scientific men. They can tell us why it is salt and also the exact proportion of every component part of it; but how it is salted, has never yet been satisfactorily ascertained. Indeed, we might say with truth, that we know more of the nature of the planet Jupiter, than we do of that vast expanse of water which is so familiar to every one. We can tell that the substance of Jupiter is light as a cork, and that the same effort which on this earth would enable a power to leap two feet above the surface of the ground, would on his surface carry them over a church or a monument; but in what manner the sea has been made salt we must rest satisfied with hypotheses.

Sea water is not the same in all places, but seems to be affected considerably by climate and other causes. It contains besides pure salt many extraneous matters, as—muriates of magnesia and lime, with sulphate of soda, which seem to be its principal ingredients.—Muriate of soda or common salt is obtained by boiling or by evaporation in the air, and is universally known as one of the chief necessaries of life.

The saltness of the sea seems to be less in general towards the poles, than under the equator; but to this rule there are also exceptions; although these are generally in gulfs which receive the waters of a great many rivers. Bergmann has given a table of the saltness of the ocean in different parts; and we find that the water surrounding Britain and the coast of France contains from 1-30 to 1-40 of salt, but in some other parts salt composes as much as 1-12 of its weight. The water is in several places less salt at the surface than at the bottom, but in this latter case it generally loses its bitterness—sea water raised from a depth of 70 or 80 fathoms is almost drinkable, and tastes something like fresh water mixed with common salt; when analysed it has no magnesia.

It is easier to perceive the great advantages resulting from the saltness of sea water than to discover its origin. Without this saltness and without the agitation continually kept up, the water of the sea would become tainted, and would be less adapted for the motion of vessels, and it is probably to this that the inhabitants of the ocean owe their existence.—But whence comes this saltness? Some have said that it is from beds of salt lying at the bottom of the sea. But these beds, if they exist, would rather seem to be deposits formed from the salt water by precipitions. Others have said that it originates from the corruption of river water, but this can scarcely be, as in that case the sea would be becoming more salt every day, from the waters rushing into it. This is not the case. Various other hypotheses might be mentioned, more fanciful than philosophical. It is one of those mysteries of which it would seem we must remain ignorant, though we may feel its reality, we cannot trace it to its cause. Sea Water may be made drinkable by distillation, but this can never be done on a large scale, as it requires too much care and fuel, and even when distilled is by no means pleasant. It is however sometimes a partial relief to the mariner when exposed to all the horrors of suffering from thirst, on his way across the pathless ocean.

The temperature of the sea changes less suddenly and less easily than that of the atmosphere. Sea water is a bad conductor of heat. Besides, the solar rays cannot heat the bottom of the sea, as they never penetrate beyond two or at most three hundred feet. Beyond that limit, the sea receives no more light, though it may a little heat. Experiment has proved that the temperature of the sea diminishes, the greater the depth, though it is not likely that the sea in any part is actually congealed.

Marine ice is formed mostly towards the poles, where the saltness of the sea diminishes and the temperature is very low. These huge islands of ice are sometimes of enormous extent. Cook found a chain of them, which joined Eastern Asia to North America. The appearance of these fields of ice surpass all that imagination can conceive. They appear in some parts mountains of pure crystal, and valleys sown with diamonds; sometimes they appear like towers and churches, adorned with pinnacles of the finest architecture. There is, perhaps, no danger so appaling as that of being wedged in by these mighty barriers of ice. It is in vain, after that, the axe is plied in this solitude of death. The only chance of safety is in leaving their vessels, and travelling over this continent of water: they consider themselves fortunate, if they should reach the shores of Siberia or Nova Zembla. But there is genrally little hope for the unfortunate mariner. The treacherous ice engulfs him, or he is devoured by that tyrant of these regions, the white bear; or, losing his vital heat, his feet are frozen to the ice, his blood stagnates and the polar night becomes to him a night that is eternal. There are many other phenomena connected with the ocean, which it might be interesting to notice, but space is limited, and we must leave at present "the cradle," as an eminent philosopher has called it, "and perhaps the grave of the universe." J. C.

Retrospect of Geological Mutations.

Such is a plain enunciation of the results of our investigations; but I will embody these inductions in a more impressive form, by employing the metaphor of an Arabian writer, and imagining some higher intelligence from another sphere, to describe the physical mutations of which he may be supposed to have taken cognizance, from the period when the forests of Portland were flourishing, to the present time. Countless ages ere man was created, he might say, I visited these regions of the earth, and beheld a beautiful country of vast extent, diversified by hill and dale, with its rivulets, streams, and mighty rivers, flowing through fertile plains. Groves of palms and ferns, and forests of coniferous trees, clothed its surface; and I saw monsters of the reptile tribe, so huge that nothing among the existing races can compare with them, basking on the banks of its rivers and roaming through its forests; while in its fens and marshes, were sporting thousands of crockodiles and turtles. Winged reptiles of strange forms shared with birds the dominion of the air, and the waters teemed with fishes, shells, and crustacea.—And after the lapse of many ages I again visited the earth; and the country, with its innumerable dragon-forms, and its tropical forests, all had disappeared, and an ocean had usurped their place. And its waters teemed with nautuli, amnonites, and other cephalopoda, of races now extinct; and innumerable fishes and marine reptiles. And thousands of centuries rolled by, and I returned, and lo! the ocean was gone, and dry land again appeared, and it was covered with groves and forests; but these were wholly different in character from those of the vanquished country of the iguanodoa. And I beheld, quietly browsing, herds of deer of enormous size, and groups of elephants, mastodons, and other herbiverous animals of colossal magnitude.—And I saw in its rivers and marshes the hippopotamus, tapir, and rhinoceros; and I heard the roar of the lion and the tiger, and the yell of the hyena and the bear. And another epoch passed away, and I came to the scene of my former contemplations; and all the mighty forms which I had left had disappeared, the face of the country no longer presented the same aspect; it was broken into islands, and the bottom of the sea had become dry land, and what before was dry land had sunk beneath the waves. Herds of deer were still to be seen on the plains, with swine, and horses and oxen; and wolves in the woods and forests. And I beheld human beings, clad in the skins of animals, and armed with clubs and spears; and they had formed themselves habitations in caves, constructed huts for shelter, inclosed pastures for cattle, and were endeavouring to cultivate the soil. And a thousand years elapsed, and I revisited the country, and a village had been built on the seashore, and its inhabitants supported themselves by fishing; and they had erected a temple on the neighbouring hill, and dedicated it to their patron saint. And the adjacent country was studded with towns and villages; and the downs were covered with flocks, and the valleys with herds, and the corn-fields and pastures were in a high state of cultivation, denoting an industrious and peaceful community. And lastly, after an interval of many centuries, I arrived once more, and the village was swept away, and its site covered by the waves; but in the valley and on the hills above the cliffs a beautiful city appeared; with its palaces, its temples, and its thousand edifices, and its streets teeming with a busy population in the highest state of civilization; the resort of the nobles of the land, the residence of a monarch of a mighty empire. And I perceived many of its intelligent inhabitants gathering together the vestiges of the beings which had lived and died, and whose very forms were now obliterated from the face of the earth, and endeavouring, by these natural memorials, to trace the succession of those events of which I had been a witness, and which had preceded the history of their race. —*Mantell.*

Smithsonian Institute.

One of the chief subjects of research now occupying the Smithsonian Institute is meteorology, and particularly in reference to the phenomena of storms. It is stated in the late report of the Institute, that of late years, in our country, more additions have been made to meteorology, than to any other branch of physical science.

Mr. Epsy, Mr. Redfield, Mr. Loomis and others, have contributed largely to this science, and have already arrived at some important realizations. A system of observation has been commenced by the Institution, which is to be extended over the North American continent. Within the limits of the U. S., observations are to be made on the lakes and the coast, at stations not more than a hundred miles apart, and it is intended that the interior shall be divided into districts not exceeding one hundred miles square each, in each of which there shall be stations. The Royal Society will establish a system of corresponding observations in the British Provinces. Observations, partly with facilities afforded by government officers, are about to be made in Chili, in Mexico, in California, and in Oregon. The government have fifty-seven military posts at which observations are made. We have observations from 41 academies in New-York and thirty-five stations in Pennsylvania, and there are many private individuals scattered over the country who are making barometric and thermometric observations. These observations are to be transmitted to the Institution, which is to digest and publish them. The Institution furnishes instruments and instructions to observers, where necessary. Professor Loomis says, in his memoir, that the system of observations, if faithfully prosecuted, for one year, would well nigh exhaust the subject—the storms of each year being but a repetition of those of the preceding. But a period of operation less than three years is not calculated upon.

Visiting the Institution the other day, I was informed that the reports from hundreds of observers were coming in, and are committed to a very able hand, Dr. Forman, for digestion.

Professor Loomis has properly estimated the value of meteorological science, in his report to the Institution. It will advance the prosperity of the planter, and farmer and merchant, and give security to the navigator. In the gale of Dec. 15, 1839, says the reports, 89 vessels were wrecked on the Massachusetts coast, and of these 61 on a single cape. In the great hurricane of 1780, 13 line of battle ships were lost, and 16 were dismasted. England and America alone suffer an annual loss, from wrecks, of more than 1000 vessels; and nearly one half the loss is on the American shore.

Through the magnetic telegraph, a person in New-York may be advised of the commencement of a winter storm, which requires twenty-four hours to travel from St. Louis to the Atlantic. The navigator may be put on his guard. When the laws of storms as well of summer showers shall be understood, every one can be made aware of approaching changes of weather. The character of a season may be known to the agriculturist.

But other important applications, now scarcely thought of, will, no doubt, be made of this noble science, which is so soon to be perfected, for practical purposos, through the medium of the Smithsonian Institution.—*Cor. Jour. Com.*

Great Achievement of Science.

It is known to those acquainted with coal mining, that mines frequently take fire and burn for years, to the immense destruction of property; or are only subdued by turning some stream or river into, and thus, by submerging them, subduing the fire. It appears that on 2nd April, one of the coal mines at Astley took fire, when the proprietor, John Darlington, Esq., wrote for Mr. Goldsworthy Gurney, whose application of high pressure steam to the ventilation of coal mines has been so successful. It immediately occurred to Mr. Gurney that if he could generate and inject a sufficient quantity of carbonic acid gas, azote or any other incombustible medium into the pit that he would be able to extinguish the fire. He set to work and erected a small furnace with brick, and, by means of some other simple appliances, was able to generate from the atmospheric air, and the waste coal about the mine, such quantities of incombustible gases as effectually subdued the fire in an incredibly short space of time. The galleries and lateral workings of this mine extended over a space of above three miles, and the downcast shaft was 390 feet deep. The quantity of gas generated was at the rate of about 6,000 cubic feet per minute. Thus has Mr. Goldsworthy, by a successful application of science, overcome a gigantic accident, that has shut up many mines, and laid whole districts idle, at a cost, as stated by Mr. Darlington, the proprietor of the mine, to be not more than as many pence as by the process of submerging it would have been pounds over and above the the delay and loss occasioned by not working the mine.

Woven Iron.

Messrs. Wickersham and Walker, of Philadelphia, have a patent for the manufacture of *woven iron*, by which they are enabled to weave iron as large as railroad bars, or the smallest description of wire. They are now applying it to the following purposes. Iron railings of endless varieties, embracing beauty, strength, and style of finish never surpassed, for public grounds, buildings, cottages, verandahs, lawns, cemeteries, &c., iron bridges, galleries for churches, gratings for prisons, window shutters, and grating for stores, columns and cornices for cottages, tree-boxes, summer houses, guards for decks of steamboats and vessels, &c., being cheaper than wood or cast-iron.

Vinegar from Beets.

It is stated that the juice of one bushel of sugar beets will make from five to six gallons of vinegar, by washing, grating, expressing, and exposing two weeks to the air in the barrel, with a guaze-covered bung-hole.