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The Edinburgh new philosophical journal.

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Article/Chapter Title: Of the Changes which life has experienced on the globe

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after man and the orang-outang, might lead to the inference of a proportional developement of the intellectual faculties; but, with reference to this subject, we have only the relations of fishermen, who affirm, that the dolphin, like the whales, loves to live in society, that it performs great migrations, has a great attachment to its young, and defends them courageously when they are pursued.

The figures of the plate accompanying this memoir represent the brain of the dolphin: 1st, by its upper surface; 2dly, by its base; 3dly, the cerebellum and tubercula quadrigemina; 4thly, the vertical section of the cerebellum made in the middle; 5thly, the brain, without the upper part of the hemispheres, which are removed to the level of the centrum ovale of Vieussens, and of the lateral ventricles.

Of the Changes which Life has experienced on the Globe.

FOSSIL remains of the animals which preceded man upon the earth are every day discovered on both continents; and every day are the documents regarding the history and successive changes of the various races that existed before the present, increased by new facts. This is equally the case with the vegetation which embellished the earth at that remote period, and with which those primitive animals were necessarily in close connection. New animals and vegetables have assumed the place of those that have been destroyed, and whose ancient existence is only revealed to us by their fossil remains. Thus, in the course of the ages that preceded the appearance of man upon the earth, its surface has successively changed its aspect, its verdure and its inhabitants; the seas have nourished other beings, the air has been peopled with other birds.

The remains of these various successions of animals and vegetables attest that they were at first much more uniform. The vegetables of the coal formation, for example, scarcely present any difference, whatever may be the latitude, the longitude, or the elevation at which they are found. Europe, Asia, and the two Americas, alike produced elephants, rhinoceroses, mastodons, &c. The differences which vegetables and animals exhi-

bit at the present day, according to the various climates or situations in which they occur, have been gradually established under the predominating influence of a small number of natural causes, and constitute at length the order of distribution which life now presents at the surface of the earth.

Originally life extended from one pole to the other, and animated the whole of this surface. The frozen regions of the North, and the snow-clad summits of the Alps, were covered with the same verdure; and the forms of the pristine animals and vegetables presented either extraordinary types of which we have now no example, or species which belonged to families and genera still existing, but in most cases only between the Tropics. As we approach nearer to the present times, we find in all places remains more and more resembling those of the plants and animals which now live in the same country. At a later period, the original races of animals and vegetables were gradually expelled from the north toward the south, from the summits to the plains, in proportion as the uniform mean temperature of the earth's surface yielded to more powerful causes, which brought about the establishment of climates. These gradual variations in the temperature, the lowering of the general level of the seas, the equally successive and gradual diminution of the energy of volcanic phenomena arising from the original igneous state of the earth, as well as of the strength and power of atmospheric phenomena, and of the tides—such were the regular, general, and continued natural causes of the modifications which life has undergone, and of almost all the changes that have been produced upon the earth's surface. The results of these first causes, such as the establishment of local influences over the temperature of the same climate, the formation of a multitude of particular basins, some containing salt, others fresh water; the pouring out of these lakes into one another, and into the great basin of the sea; the partial debacles which thence resulted; the ravages of the sea on the low parts of the continents at first, and then the formation of vast lagoons in the same places; lastly, the establishment of the general system of draining and watering, or of the hydrographic reticulation which covers the globe—such were the irregular, and more or less violent and perturbing secondary causes of the partial vicissitudes experienced by animal

and vegetable life. The beings, which were unable to resist the influence of these various causes were destroyed and disappeared from the earth, with the circumstances for which they were created ; new species appeared with new conditions of existence. But, in examining the series of fossil remains that are found buried in the strata of the globe, there is nowhere perceived a distinct line of demarcation between the different terms of that series, so as to prove that life has been once or oftener totally renewed on the earth. On the contrary, we discover in it a proof of the successive and gradual change which we have pointed out. Certain primitive types have indeed completely disappeared, but they are found existing at various epochs, and their remains are blended with those of more modern types ; along with new species of types still existing, we find some of anterior epochs ; certain genera that yet obtain are common to all the terms of the series ; and toward the end of the series, we find the remains of some of our present species along with ancient types and extinct species. In consequence of the establishment of climates, life has almost entirely abandoned the polar countries, and the glaciers have usurped, on the high summits, the place of the verdure of primeval times. Palms, date-trees, cocoas, dracænæ, pandani, arecæ, the great reed, and the arborescent ferns, have forsaken our climates, together with the elephants, tigers, panthers, hippopotami, the gigantic tapirs, the rhinoceroses, palæotheria, anaplothæria, mastodons, and other extinct animals, as well as those enormous reptiles whose forms were so extraordinary. Sole masters, in those times, of the countries now subjected to the dominion of man, these animals are either entirely destroyed, or now live only between the tropics.

Man appears to have arrived upon the earth only after its surface was adapted to receive him, after the establishment of climates, and when a happy equilibrium among the elements had determined the permanency of the present state of things, or at least had rendered its variations almost imperceptible.

Such is a brief view of the changes which life has experienced at the surface of the globe, and of the causes which have produced those changes. Our theory, which is founded on all the facts that have been established, cannot but prevail over the systems hitherto proposed, for it is in harmony with the natural

laws of order and permanency which rule the universe, and is, moreover, supported by the most accredited physico-mathematical theories; whereas those systems, founded upon perturbations of cataclysms, which science, facts and human reason equally reject, only increase the number of those imaginary conceptions which have been successively published for several centuries.

The above will suffice to shew, that there is no subject which, in all points of view, is more worthy to excite the interest and meditations of philosophers, and the investigations of geologists and naturalists.

The Disasters of Tivoli.

THE city of Tivoli, whose origin is lost in the obscurity of remote ages, is situate on the slope of a steep rock, traversed by the Anio, which in this place precipitates itself from a height of more than 100 feet, and then proceeds to water the plain of Rome, where it soon unites with the Tiber. The rock is formed of a sort of conglomerate, rather friable, and subject to be worn away by the river, which, in the impetuosity of its descent, has scooped out numerous caverns, to which the poets have given the mythological names of the Grottoes of Neptune, the Syrens, &c. Every body has seen paintings or engravings of these sportings of nature, which present the most varied appearances, and render the site of Tivoli one of the most curious in the world. The rock on which the city is built has been perforated in various directions by the river, which has formed numerous subterranean caverns, of which the inhabitants have availed themselves for the purpose of putting in motion several forges and manufactories which give a very animated appearance to the country. A little above the town, the Anio had been divided into two branches, by means of a sluice, which threw the greatest mass of its waters to the left, on the side next the town, whence, after passing under the broken bridge, they proceeded to be engulfed in the Grotto of Neptune, immediately beneath the Sibyl's Temple. This branch filled the subterranean canals of which we have spoken, and after passing through the *Villa Mecene*, fell in broad sheets called the *Cascatelles*.