

ON THE MAGNITUDE AND GRANDEUR OF THE SUN.

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Among all the objects of the visible creation there is none whose beauty is so much admired, and whose benign influence is so generally appreciated, as the sun. Every day this glorious orb visits us with his cheering beams, dispels the shades of night, and diffuses joy and animation among all the tribes of sensitive existence; without whose powerful energy, our world would soon become a dark and shapeless chaos, without life, order, or enjoyment. But the splendour of this luminary, and the benefits it confers, are so common, and so regularly continued, that we are apt to view them with indifference; and we seldom contemplate, with the eye of an enlightened understanding, the wonderful nature of that vast globe on which surrounding worlds depend for all the comforts and beneficial agencies they enjoy. To the vulgar eye, the solar orb appears only like a flat luminous circle of a few inches diameter; and there are thousands of mankind who consider it in no other light than as a brilliant lamp, of no great size, hung up in the firmament to give us light by day, and to enable us to prosecute our daily labours. Even minds of a more elevated and reflecting cast have seldom entered into all the sublime ideas connected with the nature and properties of this august luminary: and it is questionable whether the greatest astronomer now existing is capable of forming a conception of the magnitude and sublimity of the solar orb, corresponding to its vast extent and its real grandeur. To enable the reader to form some faint idea of the immense magnitude of the sun, we extract the following passage from a work just published, entitled, "Celestial Scenery."

"The magnitude of this vast luminary is an object which overpowers the imagination; its diameter is calculated at 880,000 miles, its circumference is 2,764,600 miles, its surface contains 2,432,800,000,000 square miles, which is twelve thousand three hundred and fifty times the area of the terraqueous globe, and nearly fifty thousand times the extent of all the habitable parts of the earth; its solid contents comprehend 356,818,730,200,000,000, or more than three hundred and fifty-six thousand billions of cubical miles. Were its centre placed over the earth, it would fill the whole orbit of the moon, and reach two hundred thousand miles beyond it on every side. Were a person to travel along the surface of the sun, so as to pass along every square mile on its surface at the rate of thirty miles every day, it would require more than two hundred and twenty millions of years before the survey of this vast globe could be completed. It would contain within its circumference more than thirteen hundred thousand globes as large as the earth, and a thousand globes of the size of Jupiter, which is the largest planet in the system. It is more than five hundred times larger than all the planets, satellites, and comets belonging to our system, vast and extensive as some of them are. Although its density is little more than that of water, it would weigh 3360 planets such as Saturn, 1067 planets such as Jupiter, 329,000 globes such as the Earth, and more than two millions of globes such as Mercury, although its density is nearly equal to that of lead. Were we to conceive of its surface being peopled with inhabitants, at the rate of 280 to every square mile, (which is the rate of population in England,) it would contain 681,184,000,000,000, or more than six hundred and eighty billions, which would be equal to the inhabitants of eight hundred and fifty thousand worlds such as ours.

"Of a globe so vast in its dimensions, the human mind, with all its efforts can form no adequate conception. If it is impossible for the mind to take in the whole range of the terraqueous globe, and to form a comprehensive idea of its amplitude and its innumerable objects; how can we ever form a conception, approaching to the reality, of a body one million three hundred thousand times greater? We may express its dimensions in figures or in words; but in the present state of our limited powers, we can form no mental image or representation of an object so stupendous and sublime. Chained down to our terrestrial mansion, we are deprived of a sufficient range of prospect so as to form a substratum to our thoughts when we attempt to form conceptions of such amazing magnitude. The imagination is overpowered and bewildered in its boldest efforts, and drops its wing before it has realised the ten thousandth part of the idea it attempted to grasp. It is not improbable that the largest ideas we have yet acquired, or can represent to our minds, of the immensity of the universe, are inferior to a full and comprehensive idea of the vast globe of the sun in all its connexions and dimensions. And therefore, not only must the powers of the human mind be invigorated and expanded, but also the limits of our intellectual and corporeal vision must be indefinitely extended, before we can grasp the objects of overpowering grandeur which exist within the range of creation, and take an enlightened and comprehensive view of the great Creator's empire. And as such endowments cannot be attained in the present state, this very circumstance forms a presumptive argument that man is destined to an immortal existence, where his faculties will be enlarged, and the boundaries of his vision extended, so as to enable him to take a large and comprehensive view of the wonders of the universe, and the range of the Divine government. In the meantime, however, it may be useful to allow our thoughts to expatiate on such objects, and to endeavour

to form as comprehensive an idea as possible of such a stupendous luminary as the sun, in order to assist us in forming conceptions of objects still more grand and magnificent. For the sun which enlightens our day is but one out of countless millions of similar globes dispersed throughout creation, some of which may far excel it in magnitude and glory."

As the sun is a body of inconceivable magnitude, it appears that extensive and amazing processes and operations are going forward on its surface, or in its immediate vicinity: "this appears from the immense size both of the dark and the luminous spots, and the sudden and extensive changes to which they are frequently subjected. Spots have been observed on the solar disk so large as the one-twentieth part of the sun's diameter, and, of course, 44,000 miles in lineal extent, comprising an area of one thousand five hundred and twenty millions of square miles. Now, it is known from observation, that such spots seldom or never last longer than forty-four days; and, consequently, their borders must approach at the rate of at least a thousand miles a day, but in most cases with a much more rapid motion. What then, shall we think of the motions and operations by which a large spot has been made to disappear in the course of twenty-two hours? as I have sometimes observed; yea, which have disappeared in the course of a single hour? And what shall we think of the process by which a spot as large as the earth was broken into two during the moment of observation, and made to recede from each other, as was observed both by Dr. Long and Dr. Wollaston? How powerful the forces! how rapid the motions! and how extensive the changes which must have been produced in such cases! Whether we consider such changes to be produced in the solid globe of the sun, or merely in the luminous atmosphere with which it is environed, the scale on which such movements and operations must be conducted is immense, and altogether overpowering to the imagination. What should we think were we to behold the whole of the clouds which float in the earth's atmosphere, dissipated in a moment? the continent of America detached from its basis, and transported across the Atlantic? or the vast Pacific Ocean, in the course of a few days, overwhelming with its billows the whole of Asia, Africa, and Europe? Amazing as such changes and revolutions would appear, there are in all probability, operations and changes, though of a very different description, taking place on the solar surface or atmosphere, upon a scale of much larger extent. It is found by calculation, that the smallest space containing a visible area which can be distinctly perceived on the sun with good telescopes, is about 460 miles; and a circle of that diameter contains above 166,000 square miles. Now those ridges or corrugations formerly termed *faculae*, which are seen near the sun's margin, are more than twenty times larger than such a space; they evidently appear to be elevations and depressions on the solar surface, and are almost as distinctly perceptible as the wavings and inequalities on the surface of the moon. How immensely large and elevated, then, must such objects in reality be, when we perceive their inequalities so distinctly at the distance of ninety-five millions of miles! The elevated parts of such objects cannot be less than several hundreds of miles above the level of the valleys or depressions, and extending in length several thousands of miles; yet sometimes in a few days, or at most in a few weeks, these extensive objects are either dissipated, or dark spots appear in their room, evidently indicating the existence of stupendous powers, which are in constant operation in connexion with this august luminary."

The following is a comparison of the expansive view from Mount Etna with the amplitude of the sun: "When we ascend to the top of Mount Etna or Mount Blanc, and survey the vast group of surrounding objects which appear around and beneath us, when the morning sun illuminates the landscape, we behold one of the largest and most expansive objects that can meet our eye in this sublunary scene, and we can compare it with objects that are smaller, and with those that are somewhat larger. But the amplitude of such a scene extends only to about one hundred and fifty miles in every direction, which is less than the least visible spot or point which we can perceive on the sun with the most powerful telescopes.

"Let us compare more particularly the view from Mount Etna with the amplitude of the sun. 'There is no point on the surface of the globe,' says Mr. Brydone, 'that unites so many awful and sublime objects as the top of Etna, and no imagination has dared to form an idea of so glorious and magnificent a scene. The body of the sun is seen rising from the ocean, immense tracts both of sea and land intervening; the islands of Pinari, Alicudi, Lipari, Stromboli, and Volcano, with their smoking summits, appear under your feet, and you look down on the whole of Sicily as on a map, and can trace every river through all its windings, from its source to its mouth. The view is absolutely boundless on every side, so that the sight is every where lost in the immensity.' Yet this glorious and expansive prospect is comprised within a circle about 240 miles in diameter, and 754 in circumference, containing 45,240 square miles, which is only the 1-53,776,608th part of the surface of the sun; so that fifty-three millions seven hundred and seventy-six thousand landscapes, such as beheld from Mount Etna, beheld to pass before us ere we could contemplate

a surface as expansive as that of the sun. And if every such landscape were to occupy two hours in the contemplation, and twelve hours every day allotted for the survey, it would require twenty-four thousand five hundred and fifty-four years before the whole surface of this immense globe could be in this manner surveyed; and, after all, we should have but a very imperfect view of the vast system of the sun."

"It is owing to the existence and agency of the sun that our globe is a habitable world, and productive of enjoyment. Almost all the benign agencies which are going forward in the atmosphere, the waters, and the earth, derive their origin from its powerful and perpetual influence. Its light diffuses itself over every region, and produces all that diversity of colouring which enlivens and adorns the landscape of the world, without which we should be unable to distinguish one object from another. By its vivifying action vegetables are elaborated from inorganic matter, the sap ascends through their myriads of vessels, the flowers glow with the richest hues, the fruits of autumn are matured and become, in their turn, the support of animals and of man. By its heat the waters of the rivers and the ocean are attenuated and carried to the higher regions of the atmosphere, where they circulate in the form of vapour, till they again descend in showers to supply the sources of the rivers, and fertilize the soil. By the same agency, all winds are produced, which purify the atmosphere, by keeping it in perpetual motion; which propel our ships across the ocean, dispel noxious vapors, prevent pestilential effluvia, and rid our habitations of a thousand nuisances. By its attractive energy the tides of the ocean are modified and regulated, the earth conducted in its annual course, and the moon sustained and directed in her motions. Its influence extends even to the mineral kingdom, and is felt in the chemical compositions and decompositions of the elements of nature. The disturbance in the electrical equilibrium of the atmosphere, which produces the phenomena of thunder, lightning, and rain, and the varieties of terrestrial magnetism; the slow degradation of the solid constituents of the globe, and their diffusion among the waters of the ocean, may all be traced, either directly or indirectly, to the agency of the sun. It illuminates and cheers all the inhabitants of the earth, from the polar regions to the torrid zone. When its rays gild the eastern horizon, after the darkness of the night, something like a new creation appears; the landscape is beautifully adorned with a thousand shades and colours, millions of insects awake and bask in its rays, the birds start from their slumbers and fill the air with their melody, the flocks and herds express their joy in hoarser acclamations, man goeth forth to his work and to his labour, all nature smiles, and the hills rejoice on every side. Without the influence of this august luminary, an universal gloom would ensue, and surrounding worlds, with all their trains of satellites, would be shrouded in perpetual darkness; this earth would become a lifeless mass, a dreary waste, a rude lump of inactive matter, without beauty or order; no longer should we behold the meadows clothed with verdure, the flowers shedding their perfumes, nor the valleys covered with corn; the feathered songsters would no longer chant their melodious notes, all human activity would cease, universal silence would reign undisturbed, and this huge globe of land and water would return to its original chaos."

LOSS OF LIFE BY WAR.—Only a small part of the victims in war perish by the cannon and the sword. In France, the mortality among soldiers generally in youth or middle life, was found to be even in peace nearly twice as great as among galley slaves. In a time of war they live on an average about three years; and even in peace their life is probably shortened fifteen or twenty years. Their exposures, hardships, and diseases often sweep them away like dew before the sun,—in some cases one half, in others three-fourths, in another still nearly nine-tenths!

Look at the havoc of single battles—at Austerlitz 20,000; at Dresden 30,000; at Waterloo 40,000; at Eylau 50,000; at Borodino, 80,000. Still worse in ancient times,—at Issus 110,000; at Arbela, 300,000; in one battle of Cæsar 363,000, and in another 400,000 of the enemy alone; in the siege of Jerusalem more than a million, and in that of Ancient Troy not less than two millions! In the Russian campaign there perished in six months, more than half a million, and during twelve years of the recent wars in Europe no less than 5,300,000! The army of Xerxes, probably more than 5,000,000 was reduced in less than two years, to a few thousands. Jenghiz-khan butchered in the district of Herat, 1,600,000, and in two cities with their dependencies, 1,760,000; and the Chinese historians assure us that during the last twenty-seven years of his reign, he massacred an average of half a million every year, and in the first fourteen years no less than eighteen millions; 31,500,000 in forty-one years by a single hand!! Grecian wars sacrificed 15,000,000; those of the twelve Cæsars, 30,000,000; those of the Crusades, 40,000,000; those of the Saracens and the Turks, 60,000,000 each; those of the Tartars 80,000,000. Dr. Dick reckons the sum total of its victims, at no less than *fourteen thousand millions*, eighteen times as many as all the population now on the globe; and Burke conjectures the number to have been **THIRTY-FIVE THOUSAND MILLIONS.**