

## RELATIONS OF ASTRONOMICAL AND GEOLOGICAL SCIENCE.

(By Sir D. Brewster, in the North British Review. May.)

In taking a general view of the two great sciences which embrace the phenomena and constitution of the inorganic universe,—the sciences of astronomy and geology—we have been often struck with the singular relation in which they stand towards each other, as well as with the numerous points of resemblance and of contrast which they display. To connect the study of stars with that of stones,—and to compare the geologist, digging into the bowels of the earth, and splitting its pavement, with the astronomer, penetrating into sidereal space, establishing laws, and predicting phenomena, may subject the cultivators of the one science to the charge of presumption, or the friends of the other to that of renouncing the pre-eminence which has ever been conceded to the objects of their pursuit; but, however unfavourable might have been the contrast between the study of the heavens, and that of the earth in the infancy of geology, science now disclaims the distinction, and recognises the unity and equality of her priesthood in the convergency of her truths to one common centre, and in the concentration of their sacrifice on one common altar.

While the astronomer is studying the form and condition and structure of the planets, in so far as the eye and the telescope can aid him, the geologist is investigating the form and condition and structure of the planet to which he belongs, and it is from the analogy of the earth's structure, as thus ascertained, that the astronomer is enabled to form any rational conjecture respecting the nature and constitution of the other planetary bodies. Astronomy and geology, therefore, constitute the same science—the science of material or inorganic nature.

When the astronomer first surveys the concavity of the celestial vault, he finds it studded with luminous bodies differing in magnitude and lustre, some moving to the east, and others to the west; while by far the greater number seemed fixed in space. All these bodies—sun, moon, and stars—appear to be placed at the very same distance, and it is the business of astronomers to assign to each of them its proper place and sphere,—to determine their true distance from the earth,—and to arrange them in systems throughout the regions of sidereal space. In like manner, when the geologist surveys the convexity of his own globe, he finds its solid covering composed of rocks and beds of all shapes and kinds, lying at every possible angle, occupying every possible position, and all of them, generally speaking, at the same distance from the earth's centre. Here the granite rises in lofty peaks, or is dispersed in rounded boulders. There the basalt cuts its way through beds of sandstone, or sustains them on its flanks. Here the strata rest in undisturbed tranquility, the latest deposits from a peaceful sea. There they bristle up with their rugged margin, displaying, in serrated outline, the fractured edges of ancient as well as recent beds. Everywhere, indeed, we see what was deep brought into visible relation with what was superficial—what is old with what is new—what preceded life with what followed it. Thus displayed on the surface of his globe, it becomes the business of the geologist to ascertain how these rocks came into their present places,—to determine their different ages,—and to fix the positions which they originally occupied,—and consequently their different distances from the centre or the circumference of the earth. Raised from their original bed, the geologist must study the internal forces by which they were upheaved, and the agencies by which they were indurated; and when he finds that strata of every kind, from the primitive granite to the recent tertiary marine mud, have been thus brought within his reach, and prepared for his analysis, he reads their respective ages in the organic remains which they entomb; he studies the manner in which they have perished; and he counts the cycles of time and of life which they disclose. Studies like these possess a home interest for reflecting and sympathising man. Life claims kindred with what once lived. It owns the same relation between itself and that which is yet to breathe; and if on the tombs of our fathers is inscribed the law under which we are individually to join them, we read with no less distinctness among the cemeteries of primeval death, that more general enactment under which the races of man, and the tributary creation which obeys him, shall take their place in the coming catastrophe, and

reappear to future pilgrims—memorials of the age of genius—the cycle of intellectual and immortal generations.

While thus identified in their general objects and modes of investigation, the twin sisters of terrestrial and celestial physics have been joint heirs of intolerance and persecution,—unresisting victims in the crusade which ignorance and fanaticism are ever waging against science. When great truths are driven to make an appeal to reason, knowledge becomes crime, and philosophers martyrs. The doctrine of the earth's motion and the sun's stability, hurried Galileo into the dungeons of the Inquisition, and the announcements of creations anterior to man, would have thrown Hutton and his followers into a prison, had its bolts and bars been entrusted to bigotry. Truth, however, unlike all other powers, can neither be checked nor extinguished. When compressed, it but reacts the more. It crushes where it cannot expand,—it burns where it is not allowed to shine. Human when originally divulged, it becomes Divine when finally established. At first the breath of a sage—at last it is the edict of a God. Endowed with such vital energy, astronomical truth has cut its way through the thick darkness of superstitious times, and, following in its wake, geology will soon find the same open path when it has triumphed over the less formidable obstacles of a more civilized age.

But though thus coeval in their origin, and coequal in their grandeur, and fellow-sufferers for truth, there is yet one aspect in which the physics of the earth and the heavens require to be assimilated. Every geologist who has displayed genius, or acquired fame, has served a severe apprenticeship to the hammer, and has worn out his sandals, and perchance his greaves, in creeping along river-beds and in clambering over rocks; but, however brilliant be his achievements, and however necessary the continuance of his labours, the time has arrived when geology requires another order of priesthood, who shall worship her in the closet, where the philosopher's inductive glance may dispel the illusion of the observer's eye, where a comprehensive grasp of science may correct the narrowness of his view, and where partial results, and rash hypothesis, and local theories may be combined into a high philosophy of sublunary nature. Ptolemy and Hipparchus, and Galileo, and Tycho Brahe, and Flamsteed, were the hard-working precursors of astronomical theory—the observers who supplied the raw material of that gorgeous fabric which Kepler and Newton so skillfully wove. And in the last century of our own era the law-givers of astronomy have been so completely dissociated from her observers, that neither Euler, nor D'Alembert, nor Lagrange, nor Laplace, ever measured an altitude, or recorded a meridional passage.

THOUGHT OF THE DEAD.—The thought of the dead makes us gentle and childlike, and leads us to forget ourselves, as well it may. For we know that, according to St. Paul's teaching, the spirits of just men made perfect are not far from us. We are come to them, and they are come to us. They can touch us, and we can touch them; they are gliding by every hour. The spirit has but ceased to act upon and through the body, and so we do not see them in their places. They keep threading in and out amongst us; especially so we believe from St. John, in holy churches where their bodies rest in hope. (Rev. vi.) They are the first ranks of the church who have gone before us in the Lord, so far as to be out of sight. They are beyond our view. They may see us; we cannot see them.

SPANISH MAGISTRATES.—In a late number of the Foreign Quarterly Review, the following anecdote is told to illustrate the corruption of the Spanish magistracy:—"A rich miller in the country was fixed upon by three persons as a fit object to be plucked. It so chanced that shortly before the time appointed for the attack of his house, a party of travelling soldiers requested lodgings of him for the night, which he granted; and these soldiers were sleeping above when the robbers arrived and demanded his money. The miller told them he would go and fetch it; he awoke the soldiers, and with their assistance killed the three thieves and left them lying. The next day, as it was proper the authorities should be made acquainted with the circumstances, he went to the house of the alcade magistrate of his village, to call him to make his examinations. The alcade was not at home; on finding which he proceeded to the next in office, who was not at home either. He went on to the third, neither was this man to be found, nor did any body know anything of either of the three. At last, therefore, he returned home and prepared to bury them himself, when on taking off the masks which concealed their faces, lo, and behold, there lay the three alcades!"