

For the Pearl.  
SACRED PHILOSOPHY.

No. 11.  
Distances of the Heavenly Bodies.

Behold the height of the stars, how high they are! Job xxii. 11. Canst thou find out the Almighty unto perfection? It is high as heaven what canst thou do? Job xi. 7. The Lord is high above all nations, and his glory above the heavens. Who is like unto the Lord our God, who dwelleth on high, who humbleth himself to behold the things that are in heaven? Psalm cxlvi. 4-6. As the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts. Isaiah l.v. 9. As the heaven is high above the earth, so great is his mercy towards them that fear him. Psalm ciii. 11.—

The multitudinous marshallings of hosts of worlds upon hosts of worlds, is not the only interesting subject connected with the architecture of the heavens. The countless myriads of stars which gem the skies—their majestic silence—the vastness of their masses—and their depths illimitable to the sight are alike replete with instruction for the thoughtful observer.

What theme more transporting to guilty man than mercy—what topic more cheering than divine goodness? Who would not wish to entertain large and god-like views of these hallowed perfections? How deeply thankful should we be for any assistance to climb to their topless heights—descend to their fathomless depths—or comprehend their amazing breadths! And is there any magnificent scale by which the mercy of God may be estimated? To this inquiry of so much moment to human beings, boundless intelligence directs us to the heavens—Behold the height of the stars, how high they are! Can the infinity of their distances be grasped by finite minds? Can man wing his adventurous flight from one system of worlds to other systems beyond them—can he continue his untravelled career to other groups of worlds yet beyond them in the illimitable tracts of creation, and yet soar to other hosts of globes still in endless progression through the vortex of space? The naked thought alone demonstrates our impotency—the idea fills us with vast amazement.

“Who can satiate sight  
In such a scene, in such an ocean wide  
Of deep astonishment? Where depth, height, breadth  
Are lost in their extremes; and when to count  
The high-born glories in this field of fire  
Perhaps Demetrius's computation fails.”

On such a scale of magnitude would God have us measure the riches and extent of his love:—For as the heaven is high above the earth, so great is his mercy toward them that fear him. Every Christian is thus summoned to the telescope of the astronomer. Let him devoutly survey the unbounded grandeur of the heavens—let him dwell on the immeasurable remoteness of the worlds scattered over the blue immense—let him continue with the sublime sight before him, till his mind expands and his heart glows with adoring admiration at the spectacle. No longer will he regard the beneficent Creator as a being who distributes scantily and by small degrees his mercy to his creatures. The height of the stars will admonish him of the greatness of the divine mercy. Incompetent to measure the one, he will not foolishly limit the other; and that mercy described by inspiration as great, rich, tender, plenteous, abundant, and everlasting mercy, will form his sweetest song in the House of his pilgrimage.

Of distances and magnitudes we are accustomed to judge by the organ of sight; but it may be demonstrated to the most untutored mind that vision entirely fails in relation to the heavenly bodies. Turning our eyes towards the magnificent theatre of the heavens, we are apt to suppose that it is a vast vault or concave—that we are really standing in the centre of this immense dome—that directly above us, the canopy of the sky is only a little beyond the region of the clouds—and that on either side the firmament nearly reaches to the earth, to the margin of which, we might, by perseverance, eventually travel. And how shall we be convinced that in all these conclusions we have been labouring under an optical illusion, a mere deception of the senses? Most easily. Let us set out with the mariner to travel to the outer limits of this imaginary hemisphere. We journey to the distance of a thousand miles, when lo! upon looking forward we find ourselves no nearer to the desired spot! We recommence our pursuit and sail another thousand miles and still the object is as remote as ever;—and so we might continue our course to the end of our days, but would never approximate nearer to the horizon. Nor is this all—wherever we might be we should still conceive ourselves imprisoned and in the middle of this great arch—in Africa or America, Europe or Asia there would be no perceptible difference. If then we arrive at the conclusion that there must be in reality a great dome above us, because it seems to be so, it will follow that there must be as many skies as we see vaults in the heavens—that in travelling we must in some places pass over the borders of these different hemispheres, and in other spots actually stand upon their margins. Again, the moon, the stars, and the planets appear all alike on the surface of the hollow sphere of the sky—or like so many glittering gems set in the robe of night. So Empedocles conceived that the heavens were a solid mass of air condensed by fire into crystal, and that the fixed stars were fastened into this crystal, while the planets were loose, and moved freely along it. To our unaided vision the celestial canopy seems equally distant above and around us, and the stars of the

same elevation at all times of the year. But as our earth sweeps round the sun in a mighty circle, of upwards of one hundred and ninety millions of miles in diameter, we must be nearer the fixed stars, at one period by 190 millions of miles than at another. The notion of a sphere, is however, wholly ideal. The real spherical surface is the retina within our eyes, and on this concave the stars are mapped down, leading us to suppose that the sky presents a true hemisphere.

Many persons, we are aware, are sceptical on the deductions of astronomy. Doubting the calculations of even the proficient of this science, they receive with hesitation every statement. Such scepticism is egregiously foolish. For, when there is such a general agreement of modern astronomers on the subject of these deductions—when, moreover, they are enabled with the utmost accuracy to predict the eclipses of the sun and moon—the precise period when the planets Venus and Mercury will appear to pass across the sun's disk—the return of comets from their erratic course—the very moment when any of the fixed stars shall suffer an occultation by the moon, or by any of the planets—with other facts equally indisputable—when these things are considered; to doubt the calculations of astronomers as to the distances and magnitudes of the planetary bodies, is to evince our own imbecility and ignorance. The fact is simply this—our earth may be measured, and by its size may be determined the size and distance of other bodies in space, and nothing can be more certain than these determinations. On the subject of the remoteness of the heavenly bodies, we can only ascertain positively the distances of the planets comprehended in what is termed the Solar System, or system of the sun. This name they obtain because the sun occupies the centre of the system—warms and illumines them with his beams—and in consequence of their motion round the sun, they enjoy the succession of seasons and the revolution of day and night. Of those planets whose distances are known the following statement will give a sufficiently correct idea of their remoteness:—

	English Miles.
Sun's least distance from the Earth is	93,908,984
Mercury's Do.	58,540,512
Venus' Do.	26,425,554
Mars' Do.	50,019,878
Ceres' Do.	155,000,000
Pallas' Do.	175,000,000
Juno's Do.	190,000,000
Jupiter's Do.	401,251,495
Saturn's Do.	815,627,637
Herschel's Do.	1,727,061,434

Thus according to this table Venus, sometimes seen as a morning and again as an evening star, the most beautiful single object in the heavens, and the nearest planet to our Earth, is no less than 26 millions, 425 thousand, 554 miles distant from it. While the most remote planet yet known in our system; Herschel or Uranus, is at the amazing distance of 1727 millions, 61 thousand, 434 English miles. “These are great numbers, and great calculations, and the mind feels its own impotency in attempting to grasp them. We can state them in words. We can exhibit them in figures. We can demonstrate them by the powers of a most rigid and infallible geometry. But no human fancy can summon up a lively or an adequate conception—can roam in its ideal flight over this immeasurable largeness—can take in this mighty space in all its grandeur, and in all its immensity—can sweep the outer boundaries of such a creation—or lift itself up to the majesty of that great and invisible arm on which all is suspended.”

“The vast whole  
What fancied scene can bound? O'er its broad realm,  
Immeasur'd, and immeasurably spread,  
From age to age resplendent lightnings urge,  
In vain their flight perpetual? distant, still,  
And ever distant from the verge of things,  
So vast the space or opening space that swells,  
Though every part so infinite alike.”

Nor is this a mere poetic fiction of the great philosopher Lucretius. Far beyond the limits of our planetary system the space that intervenes between it and the fixed stars is absolutely inconceivable. When far removed from home the traveller broods over the miles which separate him from friends and all he holds dear on earth, and is disheartened by the long and tiresome way. So the mariner casts a wistful look to the horizon, and measures in imagination the leagues that lie between him and his wished for haven. But what are these distances! what the distance of Mercury! of the Sun! of Uranus! Compared with the prodigious remoteness of the fixed stars, they are but a span—an inch—a point. Nor do we in the least invade the region of conjecture when we thus speak. As a proof of this, let us suppose an individual leaving a city, and to observe the spires of two of its churches. The farther he recedes from the place, the distance between the spires will appear less—and upon his return the nearer he approaches the more widely they will seem apart. So also as we sail along a shore the distant objects on land will appear to change their position according to the direction in which we may move. But go where we will on the earth's surface—let it be to the distance of thousands of miles from where we now stand—and we shall still find no difference in the apparent distances of the stars from one another,—nay the most refined instrument ever devised will give us no trace of any apparent change in their relative distance.

And the reason of this must be that they are not within our reach and are not to be measured by us. A change in the apparent distances of two objects, resulting from a change in the place from which they are seen, is necessarily less as their distance from that place is greater—but when that distance is infinitely great in the comparison, then only is this apparent change of position wholly insensible. Plainly then the stars must be immensely distant from us, or in passing from one place of the earth to that which is most remote from it, a change of relative position among those bodies would be clearly sensible.

Our knowledge of the fixed stars, it may be necessary to remind our readers, is wholly negative. We are certain the nearest fixed star cannot be less than billions of miles from the earth—how much more remote it may be we cannot tell. The planet Herschel in round numbers may be said to be 1800 millions of miles off—but in travelling from his orbit to the fixed stars, we must traverse a region of greater extent than one of three hundred thousand times the distance of the earth from the sun. Can any human mind take in this infinite remoteness. The expression in numbers for this distance, or ninety five millions multiplied by three hundred thousand will be

29,500,000,000,000

“a magnitude of such an order as the imagination almost shrinks from contemplating.” And yet many astronomers have concluded that Sirius, supposed to be the nearest star, must exceed thirty six billions, or in figures 36,000,000,000,000 miles. Astronomical instruments have been brought to such perfection; that it is said, they cannot err more than two seconds—and yet no annual parallax can be observed, thus demonstrating that the annual parallax of no fixed star is greater than this number of seconds; from this datum, by the rules of geometry it may be calculated, that none can be nearer than nineteen billions of miles. This much then may be concluded as certain—no fixed star can be nearer to us than 19,000,000,000,000 of miles. “If a body were projected from the sun with the velocity of a cannon-ball, it would take hundreds of thousands of years before it described that mighty interval which separates the nearest of the fixed stars from our sun, and from our system. If this earth which moves at more than the inconceivable velocity of a million and a half miles a day were to be hurried from its orbit, and to take the same rapid flight over this immense tract, it would not have arrived at the termination of its journey, after taking all the time which has elapsed since the creation of the world.” But if these be the prodigious distances of the stars most contiguous to our system, what must be the astonishing interval between us, and those which are myriads of times that immeasurable remoteness from us. On the supposition that one of the nebulae barely visible with his forty-foot telescope, contained five thousand stars, Sir Wm. Herschel computed that they must be eleven millions of millions of millions of miles off—but as these terms confound the imagination, their distance may be better conceived by Herschel's idea that the light has been 48,000 years progressing to us from them at its velocity of a million of miles in five seconds.

“How distant, some of the nocturnal suns!  
So distant, says the sage, 'twere not absurd  
To doubt, if beams, set out at nature's birth  
Are yet arrived at this so foreign world,  
Though nothing half so rapid as their flight.”

This very idea was entertained by M. Huygens, who conceived that there are stars so immensely remote, that the light travelling at the rate of eleven millions of miles in a minute, and having thus continued to travel from the formation of the earth, or for nearly six thousand years has not yet reached us.

Reader, the God of the Bible is the God who made the heavens and the earth. His almighty arm planted these globes of light through the interminable fields of space. He formed their matter, assigned their distances, and meted out the heavens by his span. We may climb the heights of nature—ascend from world to world—and still the dwelling place of God will be high above all these heights. Immensely high as are the stars, yet his glory is above the heavens. Nay such is the grandeur of the Deity that it is a mighty stoop of condescension to regard even the interests of the skies—for he humbleth himself to behold the things that are in heaven. The clouds are the dust of his chariot—the stars and suns are the pavement of his feet—and he is under the necessity of stooping even to observe the things that are done in heaven. Who would not fear thee, O King of nations? EDITOR.

FIRST HEBREW BIBLE.—From the year 1477, when the Psalter in Hebrew, different parts of Scripture, in the original, continued to issue from the press; and in the year 1488 a complete Hebrew Bible was printed at Soncino, a city of Cremonese, by a family of Jews, who, under the adopted name of Soncinati, established printing-presses in various parts of Europe, including Constantinople. This department of typography was almost entirely engrossed by the Jews in Italy until the year 1518, when an edition of the Hebrew Scriptures, accompanied with various readings, and rabbinical commentaries, proceeded from the splendid press which Daniel Bomberg had recently erected at Venice.