

STELLAR ASTRONOMY.

(From the *National Intelligencer*.)

The following extracts are translated by M. Meigs, Esq., of New York, from the *Leçons Professes* of the distinguished astronomer, M. Arago.

M. Arago had designed to publish these lessons in the *Revue Scientifique et Industrielle*, and their appearance was awaited with great solicitude; for no man, now existing, is believed to be more capable than M. Arago, to delight mankind by the exactness, as well as high reach of his knowledge. As soon as his design was known, he was offered fifty thousand francs for the copy-right; but he has declined this, and now intends to perfect his lessons and leave them as a precious inheritance to his heirs.

Therefore, the present lesson is the only one to be expected for some time, and this is just published in the *Revue Scientifique* for April, 1847.

LESSON—STELLAR ASTRONOMY.

We count, in the northern hemisphere, 3,400 stars, visible to the naked eye. And for the purpose of counting, we proceed in this way; through a narrow slit corresponding with the meridian of the place of observation, we look attentively and note the stars gradually as they appear.

The following approximate calculation will give an inferior limit to the number of stars visible with the powerful instruments of which we have the use.

Observation has demonstrated, that the number of the stars of the *second* magnitude is *triple* that of those of the *first* magnitude; and those of the *third* magnitude is *triple* that of those of the *second* magnitude. In a word, that in general to obtain the number of stars of the given magnitude, we must multiply by *three* the number of stars of a preceding magnitude.

Let us then, admit this law to the *fourteenth* magnitude—to stars which the most powerful instruments render visible: as the number of stars of the *first* magnitude is *eighteen*, then the number of stars visible by the naked eye, and with telescopes as far as the *fourteenth* magnitude will be about *twenty-nine millions*; and if to these *twenty-nine millions* we add those of the *thirteenth* and *twelfth* magnitudes, &c., we obtain the number of *forty-three millions* of stars.

Herschel, in that part of the heavens occupied by the knee of Orion, in a band of *fifteen* degrees long by two degrees wide, has distinctly counted *fifty thousand* stars. And as that band is only the three hundred and seventy-sixth part of the celestial vault, the entire surface of the heavens must contain *fifty-eight million seven hundred and fifty-five thousand* visible with the telescope. And as we must remark, in a great many regions of the heaven the stars are much closer together, and that with our telescopes, we can only reach the least distant celestial spaces and the stars least remote, we must recognize the fact, that the first estimate of their numbers is infinitely far from the truth; and that admitting one visible star in each square minute, we must have a number of distinct stars amounting to one hundred and forty-eight millions five hundred and seven thousand two hundred stars, and yet remain much below the truth.

There are, then, one hundred and forty-eight millions of stars, and our sun is one of them only. The mass of our earth is but the three hundred and fifty-fifth millionth part of that sun; and we are but an atom in relation to the earth; that the place we occupy is then infinitely small, and we more than infinitely little.

COMPARATIVE INTENSITIES OF THE LIGHT OF STARS OF DIFFERENT MAGNITUDE.

There is in science a great and much to be regretted blank; photometry, or the art of measuring the various intensities of light, is still in its infancy; we have hardly taken the first step.

The division of the stars by the order of their magnitude, was made by the astronomers of antiquity in an arbitrary manner and without any pretensions to exactness, and this vagueness is continued in our modern charts. Those which are accredited now, present a total table of eighteen stars of the first magnitude for the two hemispheres. Why eighteen, and not nineteen or twenty! The stars of the same magnitude are far from having all the same intensity. The sixth order, composed among the ancients, the last visible to the naked eye; and in our day, those of the seventh magnitude constitute the demarcation between the stars visible to the naked eye and the telescopic stars.

We may affirm that there are certainly stars in the firmament whose distance from the earth is three hundred and forty-four, and even nine hundred times greater than that of the stars visible to the naked eye. See what conclusion this leads us to! It is admitted that light, with the velocity of seventy-seven thousand leagues a second, takes three years to reach us from the nearest stars. And there are stars three hundred and forty-four, and even nine hundred times more remote. Then there are stars whose light does not reach us until after two thousand seven hundred years—an infinity in distance as it is in numbers.

STARS OF VARIABLE INTENSITY OF LIGHT.

Eratosthenes, in the year 275 before Christ, says of the stars in the constellation of the Scorpion; "they are preceded by the most beautiful of all the brilliant of the northern gems." At this time this is less brilliant than the southern, and above all than Arcturus. Then there have been changes since the time of Eratosthenes.

When Newton pronounced the sublime words—"Universal attraction," there was an outcry at its novelty; it was a neologism; it had occult qualities, &c. Now the words fill the world, of which they are its greatest reality.

DIAMETERS OF THE STARS.

Great diversity of opinion exists on this point. If we should take for their discs such as they appear to the naked eye, certain stars would be nine thousand millions of leagues in diameter, (equal to twenty-seven thousand times greater diameter than the sun—H. Meigs,) and the most moderate calculations would be seventeen hundred millions. Herschel's last calculation was, that Arcturus had a diameter of nearly four millions of leagues, (twelve millions of miles.) If the apparent diameter of two seconds and a half, assigned by Herschel to the *Gout*, was real, the mass of that star must be more than fourteen millions of times greater than our sun, but there is no certainty in this, nor anything to question that our sun is a star.

The sublime idea in the Holy Scriptures, that the Creator has made all with number, weight and measure, is followed by Plato, who called it the geometry of the heavens. Halley, the friend of Newton, believed that all the stars were of the same magnitude—that of our sun—and that difference of distance only caused the apparent difference of size.

NUMBER OF STARS.

The number visible by means of a telescope of twenty feet focal distance, may be more than five hundred millions.

DISTANCE OF THE STARS OF SOME NEBULÆ.

We have supposed that the nebula of which we form a part, is not the largest of the three thousand nebulae known to astronomers. Is it not very natural? Is it not as a million to one that it is so? When, therefore, on this hypothesis, and the facts stated by Herschel; that there are, at a medium, in the direction of our nebula five hundred stars, that many nebulae subtend an angle of ten minutes, and the very natural hypothesis that the distance between two consecutive stars among the five hundred is the distance of the earth from the nearest star, we must arrive at the conclusion, that there are nebulae so distant from us, that light, moving at the velocity of more than seventy-seven thousand leagues in a second of time, would take more than a million of years to reach us.

APPLES OF GOLD.

"Now also, when I am old and greyheaded, O God forsake me not. Psa. lxxi. 18. O keep my soul and deliver me: let me not be ashamed, for I put my trust in thee. Let integrity and uprightness preserve me; for I wait on thee. Psa. xxv. 20, 21.—Divine Answer: Hearken unto me, O house of Jacob, and all the remnant of the house of Israel, which are born by me from the belly, which are carried from the womb. And even to your old age I am He, and even to your hoary hairs will I carry you; I have made and I will bear, even I will carry and will deliver you." Isa. xlv. 3, 4.

God never does forsake a true believer, since he is as closely united to Christ as a child to its mother. Yes, a mother may forget her sucking child; but Jesus never forgets his ransomed people. His eyes are upon them for good continually; they are graven on the palms of his hands, and lodged in his pierced side, close to his heart. We may expect every thing confidently from him, and this confidence pleaseth him above all things. Then, O may I "be careful for nothing, but in every thing by prayer and supplication, with thanksgiving, make my requests known unto God." Phil. iv. 6; always trusting that he will as certainly carry me through all difficulties to come, as he has done hitherto; so that I may even give him thanks for it beforehand. O Lord, grant that I may practice this better still!