

MAN AS THE CENTRE OF THE UNIVERSE.*

Nearly a year ago there appeared in the "Fortnightly Review" an article on "Man's Place in the Universe," from the pen of Dr. Alfred Russel Wallace, whose name is a household word among men of science the world over. The views set forth in this essay were so divergent from those usually advocated by writers on the plurality of worlds, that much discussion was aroused. Some astronomers, in particular, attacked the soundness of Dr. Wallace's ideas with considerable vigor. But he was in nowise disheartened, and determined to explain his theories in greater detail.

Thus was born a substantial book bearing the title of the original article, and following the same general course of thought. Most writers on the plurality of habitable worlds have given free rein to the imagination, and have peopled the star depths with intelligent beings, many of whom may be vastly superior to mankind in mental power. They are not even content to leave the other bodies in our solar system tenantless. The remaining planets, especially Mars, have been made to support sentient life, and the sun itself has been supposed to shelter inhabitants who were more or less content beneath its shining surface, being protected from the intense heat by a heavy layer of black cloud. With imaginings of this sort Dr. Wallace has no sympathy. His field of inquiry is restricted to a consideration of the evidence for or against the probable existence on other worlds of such organic life, especially human, as is found upon the earth. Such an inquiry at once leads into the field of astronomy. So rapid has been the march of this science during the past few years, especially with reference to our knowledge of the sidereal universe, that Dr. Wallace considers it best to explain at length the processes employed by astronomers in this particular branch of research, and the substantial results won by their diligence. Therefore, after devoting a couple of chapters to a description of the main trend of thought pursued by former writers on the plurality of worlds, he discusses such topics as the distance and distribution of the stars, and their evolution, in the light of the "New Astronomy." To this discussion one-third of the book is devoted. The author's information

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is drawn from a wide range of the best astronomical authorities, and is substantially accurate and up-to-date. He frequently refers to the writings of Professor Simon Newcomb, who is regarded by many as the foremost living astronomer, and to those of Miss Agnes Clerke, whose explanations of the results won by modern astronomy are regarded by astronomers as complete, trustworthy, and altogether admirable.

Here and there Dr. Wallace makes remarks which show his lack of acquaintance with practical astronomy, but these little slips do not affect the general trend of his writing. For example, on p. 88 he gives numerical values of the mean errors of spectroscopic observations of the velocities of stars in the line of sight, not realizing that the accuracy of such work has vastly increased since the observations which he mentions were made. On p. 79 it is stated that the time taken by light to pass from the sun to the earth is eight minutes thirteen and one-third seconds. It is several seconds greater than this. On p. 106 we read that "violent commotions in the sun, indicated by the sudden appearance of faculæ, sun-spots, or prominences on the sun's limb, are always accompanied by magnetic disturbances on the earth"; this is not in accord with astronomical records. On p. 113 the ignition of meteors is attributed to "friction," instead of to the diminution of their energy by the pressure of the condensed air in front of them. On p. 128 one finds the astonishing statement that "of course all the variable stars are to be found among the spectroscopic binaries," an item of information which will be news to those astronomers who are busied with researches on variables.

But, as we have remarked, slips of this sort do not affect the author's main argument, which begins in the seventh chapter of his book. The conclusion toward which he works, and which he endeavors to render probable by a series of arguments which are drawn from the universe about us, and also from the physical, chemical, and biological conditions which now obtain on the earth, is "that man, the culmination of conscious organic life, has been developed here only in the whole vast material universe we see around us."

The foundation of the argument is as follows. The stellar universe is not infinite in extent, but limited. The Milky Way, which contains the vast majority of the stars, is a huge ring surrounding us. Its component

stars are made up of the chemical elements which we find on the earth and in our sun, and these elements, together with the bodies which they form, are subject to the physical laws with which we are familiar. Near the centre of the Milky Way the sun, with its planetary family, is situated. This foundation, or series of premises, is derived by Dr. Wallace from the writings of prominent astronomers, and may be said to represent, in general, the opinions prevailing among those who have looked into the subject particularly. Upon this substructure the author, availing himself continually of the best current ideas in astronomy, geology, physiology, etc., erects his superstructure. The train of reasoning is cumulative, and the method of presentation rouses the reader's interest, and puts him in sympathy with the author's contentions. The mysteries of organic life, its close adjustment to its material terrestrial environment, the changes in air, water, extent and elevation of land surface, atmospheric dust, etc., which would seriously modify or destroy man's existence, are set forth in fascinating fashion. The other planets of our system are examined and pronounced unfit for habitation; the existence of planetary systems about other stars is discussed, and its improbability asserted.

The prevalent ideas of the evolution of man's body require that climatic conditions on the earth's surface shall have been substantially stable for ages past. Dr. Wallace claims that the sun has probably been near the centre of our universe for ages, and that this central position for a long period of time has been "specially favourable, perhaps absolutely essential, to life-development on the earth." But how shall we keep the sun near the centre of the universe, during millions of years, in the face of the fact that astronomers are well-nigh unanimous in asserting that it is moving approximately toward the star Vega? To this the author replies that it is wholly improbable that the sun moves in a straight line, when all celestial movements known to us are in curves, and that it is "far more probable that we are moving in an orbit of some kind around the centre of gravity of a vast cluster, as determined by the investigations of Kapteyn, Newcomb, and other astronomers; and, consequently, that the nearly central position we now occupy may be a permanent one." On this point it must be said that astronomers generally think that the evidence now at command does not indicate that there is a centre about which the sun revolves.

However, this evidence does not exclude such an hypothesis, and André in his recent and highly praised work on stellar astronomy shows that such a theory of revolution conforms to certain facts about the observed proper motions of stars, and even deduces — by making certain assumptions — a period of twenty-two million years for a single revolution.

But, after all, what shall we say of a speculation which suggests the startling thought that man is perchance the designed outcome and crown of the workings of a universe which is so extensive and magnificent that the human mind is smitten with awe in contemplating its vastness, complexity, and splendor? Is it possible that the Creator has employed means so stupendous for the development of a creature seemingly so insignificant as man? Let us remember that the apparent immensity of the circuit of the Milky Way is due to the shortness of the measuring rod which we apply to it, and that the shortness of the measuring rod is due to the fact that our physical forms are small and move slowly about the earth's surface, chained thereto by gravity. If we were to believe that the soul of man, when once it has laid aside "this muddy vesture of decay," can fly to Arcturus as quickly as it can now think itself there, how celestial distances which now appall us by their magnitude would shrink to hand-breadths! If we were to take the distance from the sun to some star in the Milky Way as a unit of measure, how moderate would its vast circumference appear! Perhaps we should be willing to say with Milton

"that great

Or bright iners not excellence; the earth,
Though in comparison of Heaven so small,
Nor glistening, may of solid good contain
More plenty than the sun that barren shines,
Whose virtue in itself works no effect,
But in the fruitful earth; there first received
His beams, unactive else, their vigor find."

Let our conceptions of the potency, the possible future magnificence, and the splendid powers of the human spirit become sufficiently exalted. Perchance we may reach some summit of thought where we shall be ready to declare that the Almighty is not limited by our feeble and inadequate conceptions; that He — with whom a thousand years are as "a watch in the night" — knows no bounds of time or space; that He is not parsimonious amid infinite resources; that He may have brought into being our wonderful universe, and have watched over and directed its development in order that it might become a school

in which men, now in the feeble beginnings of a deathless life, might be trained for ends at present dimly perceived by them, but embraced in the all-sufficient phrase, "for the glory of God."

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