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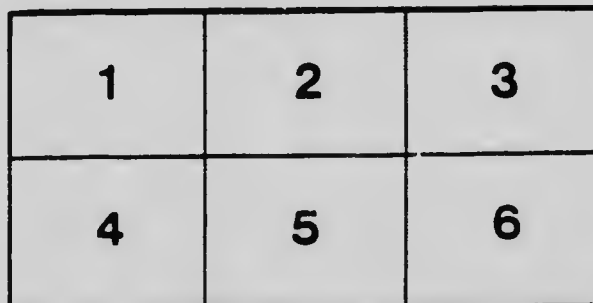
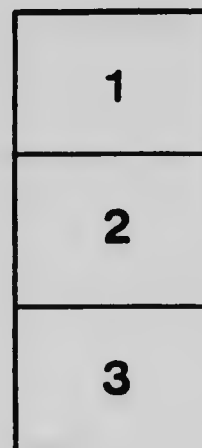
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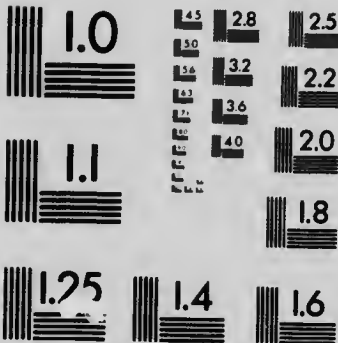
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ASTRONOMY : A CULTURAL AVOCATION

BY

ALBERT DURRANT WATSON

TORONTO,  
1918

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To my friend,  
H. L. A. Pierce,  
A. D. Watson.

## ASTRONOMY: A CULTURAL AVOCATION

BY ALBERT DURRANT WATSON

RETIRING PRESIDENT'S ADDRESS, ANNUAL MEETING, JANUARY 29, 1918

"The old lost stars wheel back, . . .  
That blaze in the velvet blue;  
They're God's own guides on the long trail—  
The trail that is always new."

**C**HILD of the universe, compounded of dust, air and ether, with a heart that thrills to the song of the morning stars and eyes that see them shimmer over the moon-silvered sea, what is more natural than that man should be an astronomer?

Twenty years ago, an old friend told me that he had lost interest in the telescope and had turned instead to the microscope. I notice that recently, despite increasing years, he is again interested in astronomy. His experience is a common one. There are stages of education when one needs to pass on to new phases of the subject in hand. Failing to do this, one loses interest. My friend had lost his enthusiasm for the game of the tyro and needed to go on to the study of laws and forces. He cared no more for the puzzle of the midnight map,—the curiosity to find the centres and outposts in the star-fields of the sky.

Astronomy is the most simple of all the sciences. Current research, however, is showing it comprehensive enough to consume the leisure of a life, and suggestive enough to tangle in its meshes the tentacles of every other movement, whether it be in science, art, philosophy, religion, commerce, or enterprise. So true is this, that no great thing can be greatly done on earth whose doing is not oriented with the stars. Time and space, theory and practice, systems and details, methods, institutions and customs must all, here or elsewhere, now or sometime, touch and reckon with the sky.

No ship ever crossed the sea that did not climb along the stars. No tower, monument, or wall was ever built to stand and stay whose permanence was due to any other cause than its own inherent response, and that of its builders, to the one central law under which "the heavens were made by the word of His power."

The earth itself is a world near the centre of a system of stars, and every operation on its surface is directed, however subtly, under the governmental program of that system. All which goes to show not only that "the undevout astronomer is mad," but also that he who fails to acquire a reasonably accurate knowledge and appreciation of astronomy, in a general sense at least, has no valid claim to be considered as an educated person. He has neglected one of the chief essentials of education, and, as a result, lacks an effective cultural instrument in the field of imagination and other intellectual processes. He must, therefore, be defective in his appreciation of both religion and science.

Education, to be graced with the distinction of true culture, need not comprise a particular knowledge of all the sciences, but should, if it would rise to such a distinction, command a general view of each great department of knowledge.

But of all the sciences none is so essential to such a characterization as astronomy. It is not merely, in a literal sense, the loftiest of the whole circle of the sciences. The awful sweep of its majestic motions, its serene and absolute order, the simplicity and wonder of its laws, the blazing splendor of certain of its

objects, and still more, the restraint with which the true astronomer regards the unspeakable sublimities of his science, all go to make star-law the first in importance of all these agencies which give the human mind its glory and vision in a field so vast that we may never know its boundaries.

It becomes necessary, therefore, to acquire, at least, a general knowledge of this science, or else relinquish all claim to a culture the chief elements of which are clear vision and a serene poise that rises superior to the pettiness of these common aims and pursuits which characterize the consciousness and occupy the time of most of the human race.

The physicist realizes, especially in recent years, that there are facts outside the realms of gross matter quite as real and dependable, though far more subtle and elusive in some cases, as those observed by the five senses. The same is true of the astronomer. He too finds abundant exercise for his powers in fields of light and law, sharing with the physicist his problems of heat and radio-activity, of electric and magnetic forces, of relativity and other spatial subtelties, of hypotheses as to atmosphere and ether, color, light and sound. The physicist cannot possibly be an efficient physicist without being also something of an astronomer; neither can the astronomer be a thorough astronomer without being also a careful physicist.

But the co-ordination of the sciences does not stop here. Both the astronomer and the physicist are allured into fields beyond the boundaries of their respective sciences; so also the chemist, the biologist, the psychologist and the ethicist. No specialist can lay claim to a liberal culture in any sense without a comprehensive view of all the sciences. Such a culture will be sufficiently generous to preclude that prejudice which the specialists in one field of science too often manifest against the results obtained in another field by methods quite as strictly scientific as those employed by themselves in their own departments.

Such a prejudice has prevailed in their past between the physicist and the philosopher. We have had controversies, not always in the scientific spirit, which is always hospitable to facts

ascertained by carefully safeguarded methods. We have been wearied by conflicts between science and religion, materialistic on the one hand, superstitious on the other; traditional religion entrenched against an insurgent science, both crudely conservative, or both narrow in vision and devoid of philosophical insight.

Too often the empty husks of thought have been used as buttresses of a conservatism from which the vital energy and living fire have long since fled, while almost as invariably, the new theory with its vivid enthusiasm is so swaddled in the crudest wrappings that the prejudices of the learned against it are almost to be condoned.

What is needed in this situation is a more general knowledge and appreciation of those canons of research which the most thorough and effective science has always maintained, and especially such as are chiefly observed by the astronomer. The careful observer in any field of research never regards a theory as more than an hypothesis unless accumulated evidence has broken down and cleared away all other and opposing theories.

The most fatal enemies of all newly acquired knowledge are those who, regarding themselves as its friends, formulate a new generalization from insufficient data, state it as a creed or a law, and straightway regard all who do not accept it as enemies of progress.

These pseudo-scientists are stout defenders of their theories. To them the "law" is all-important; the facts are treated lightly. One may at any time find them measuring and modifying their facts, ignoring those that do not fit their theory, imagining or supplying others that do, abating or enhancing the data in their eagerness to prove their theories true. They leap at once from their conviction as to the existence of a new force to a theory of its nature and purpose. The frailest possible chain of evidence is sufficient to prove what they are already convinced is true, and straightway their problem is solved.

Henceforth, their whole task is to bring new facts to *prove* that the problem is solved. This method is opposed to all the

basic principles of scientific procedure. It opens the theory in question to the reasonable antagonism of all careful investigators. It invites ridicule. This is interpreted as persecution. Every weak cause needs martyrs. A strong cause never needs anything but honest investigation of the facts. A superstitious church needs martyrs. Every pseudo-science needs martyrs. Every inadequate hypothesis needs martyrs. But the theory that the earth revolves around the sun never needed martyrs; it needed careful and honest investigators.

The study of astronomy, quite as much if not more than that of any other science, teaches us to avoid such loose methods, and saves us from results so open to suspicion. Almost the whole world had accepted the geocentric theory, but the astronomers still regarded it as an hypothesis. Now we have new theories advanced to explain the same or similar facts. These are winning favor, and must stand together with the older hypothesis and win whatever measure of support the facts may warrant. This is the scientific method. This is the astronomical method. It saves us from results so open to suspicion, so worthy of disregard if not even of a measure of contempt.

If the easy acceptance of theories supported only by facts selected by partisans is to be deprecated, so also, and even more, should we be on guard where prejudice against innovation is concerned. We know and see but in part. It is clear, therefore, that, in the long run, the progressive mind and heart will behold all things made new. Margaret Prescott Montague, in the *Atlantic Monthly* of May, 1917, tells how, for about twenty minutes, she once saw her whole life-setting in a new and infinitely more glad and radiant light. Her eyes were opened and she knew that reality is far finer and more glorious than she had ever dreamed.

The expectant attitude towards new aspects and expressions of truth greatly helps progress. Is this not, indeed, that faculty in the artist which we call susceptibility,—an openness into new fields of thought—that attitude in the soul of nature itself which we term creation, but fail to identify with our own faculty, dif-

ferent only in degree, of originality. Essentially, Creation is originality, and originality is creation, and both are divine.

Before astronomy was a science, the influences of the stars had already made human faith simpler and human hearts more kind. Thus, of many star myths cherished by our aboriginal predecessors on this continent is one in which a star was said to have loved a beautiful maiden and to have shone awhile each evening where she could gaze upon it ere her eyes closed in joyous and refreshing sleep, for she also loved the star. But one day, in the blinding light, her celestial lover lost all trace of her and could not find her again though he sought for her all round the world every day.

In the final judgment we are all young, and our childlike hearts are led to hope that it became possible for this love-lonely star to assume the heroic guise of some adventurous voyageur, and, in such a capacity, to seek and find the beloved maiden in the form of a fairy princess, the elfin child of some great Algonkian chieftain, to glorious womanhood grown, and that they together explored the vales of the Peace River, the Athabasca, and even the Mackenzie, before Henry or Sir Alexander Mackenzie had opened those territories to our commerce.

The astronomical myths of our own land are not peculiar in the fact that they lend a subtle and poetic fancy to our dreams. Every nomadic race throughout time has had a purer religion and a more perfect poetry because it gazed much upon the heavens, and, with that chief faculty of religion which we call imagination, heard the morning stars chant their orisons to the soul of all who hides within the dawn, and comes forth again in dream when the deep billows of the dark roll up the east, releasing the great white armies of the sky.

We cite only one foreign example. Every one knows how a star is believed to have led three sages from far eastern deserts to the city of peace wherein the glorious Prince of Peace was to be born.

If the pre-scientific contemplation of the stars had an effect so salutary upon those who made them their friends, how much

more should the comprehensive and accurate research of modern astronomy develop those who are the subjects of such sublime and happy inspirations!

It is not easy to perceive how the workers in any field could easily escape a realization of the cultural value of this science. And yet, too often we learn its importance only by tragedy resulting from ignorance of the subject. We are told that many of our brave young soldiers were buried in foreign lands because they were ignorant of the face of the sky, and we know that all who ever travel in the night are to some extent at the mercy of their knowledge or ignorance of the starry vault that enarches them.\*

It is a chief characteristic of all ignorance not to know the importance of the truth of which it is not aware. Lack of knowledge is not only an eclipse of vision, it is an occultation of the mind and heart, so that it not only does not see; it does not know there is anything to be seen. What it does see, it distorts and misinterprets, destroying it as a cultural force. An accurate view of even a fractional portion of such a subject as astronomy brings the whole life into a different focus so that the temple of thought gets a truer orientation.

This larger, truer vision more than suggests that if the physical universe is so extensive that we cannot think beyond space, then also the realm of laws and forces, and their appreciation in thought and feeling within the bounds of our consciousness, must, in all probability, be equally infinite.

As the intellect transcends the brain, giving the mind a magisterial relation to its own chief organ, so among the cruder materials of science, with a sense of mastery and mystery, we investigate forces and their causes, and realize our intimate relationship with the Fountain of Law, feeling that the mind that

\*The thought uppermost in the mind of Mackenzie returning from the Arctic was not pride in the deed accomplished, but a realization of his limitations in astronomical knowledge. He would go back to Britain and study the stars for a time instead of skins, planets for peltries. Agnes Deans Cameron, *The New North*, page 353.

understands and loves is not so very far in essence from that overmind which functions and expresses its being through the phenomena of nature.

We cannot measure all the final forces that lie behind the expressions of law in the physical world, but we can measure their immediate effects. Thus we do not feel as strangers in a world whose seas run ringing up their coasts responsive to the sway of the moon, for we too feel the moods and tenses of the night, and know and feel the presence of that Good Shepherd who

"Bids the stars perform their shining"

and leads the constellations like flocks of sheep along the meadows of the sky.

Thus the thought, feeling and high purpose of life are re-tuned to the music of a vaster chord. Life and the vision of life are enlarged as a result, and greater and higher achievement is inspired when a more accurate view is attained of one smallest segment of the circle of science in this field.

Preconceptions and prejudices arising out of a limited vision result often in real disaster. To misinterpret motives is one of the commonest mistakes, and a source of many moral and social tragedies. When the illuminating and restraining influence of a cultural training gives a better estimate of the motives of others, misunderstanding is ended, the vision grows clearer, and patience and sympathy become almost sublime under the regis of a science so vast in its reaches and, in its varied fields, so diverse in its conclusions.

Not only do we thus avoid misunderstanding others, we are led also to a better understanding of our own being. Few of us realize as did the ancient Greeks, how central and vital is such knowledge, and how rare.

We constantly misinterpret ourselves in life and conduct. Almost always we underestimate our own intrinsic worth while we grossly overestimate our achievement. We fail to realize our high cosmological station in the great family of life, as elements in a universal race, yet we so grossly over-value ourselves

in comparison with others that, with their larger vision and more accurate conception of relative values we must afford laughter to the gods. We have a very erroneous idea of our own relativity.

Such defects could have no better curative remedy than that furnished by the thoughtful investigation of star-laws and relations. It is true that a first thoughtful glimpse of the immeasurable universe is liable rather to discourage us with a sense of our own insignificance. But astronomy is wholesome even in this, and helps to clear the way to a realization that as our bodies are an integral part of the great physical universe, so through them are manifested laws and forces that take rank with the highest manifestation of Cosmic Being.

Thus we come to see that if our bodies are made of star-stuff, —and there is n<sup>o</sup> thing else, says the spectroscope, to make them of—the loftier qualities of our being are just as necessarily constituents of that universal substance out of which are made

“Whatever gods there be.”

We are made of universal and divine ingredients, and the study of the stars will not let us escape a wholesome and final knowledge of the fact.

The corollary is that all our conduct, ambitions and aspirations should have a universal quality. How does our daily life look in the universe? Are we behaving as divine-human beings should? Would any one know from our achievement, even when we call it success, that we are Olympians? Such questions are suggested, not theologically, nor as arising out of any particular system of religious thought, or teaching, or practice, but purely and logically by our outlook as astronomers. We are prompted to choose the wide vista, the high purpose, the great effort, leaving to others the plaything of success, while we, conscious of the universe and its forces, move on in our robes of serenity, our eyes telling the story of our far deep vision of reality.

Perhaps, the most conspicuous failure of our lives, as understood by the keen, clear insight of the seer, is found in that veil

of self-consciousness which hides this same reality from human eyes. Sooner or later, we all see this veil and deplore its paralyzing and blinding effects in our lives, with all the disaster — note the starry word — and confusion which it entails. So vast is this dislocation, this deformation of our intellectual landscape, that constant re-adjustment of our viewpoint becomes necessary with frequent rehabilitation of our *modus* and our *credo*.

This veil of self-consciousness which lies before reality is probably after all only an evidence that our hearts are young and, therefore, fearful in the strange vastness of an unfamiliar home. Man has not learned as yet to comport himself effectively in the midst of the universe, and his lack of skill makes him self-conscious. The mass of things appals him; the activity of so many forces makes him feel helpless in their presence.

We have constructed myths that frighten us with gargoyle heads and leering faces. Meanwhile of all those enlightening agencies that give us a higher altitude and wider vista, none is more effective than that noble science which we celebrate to-night.

Astronomy, by giving a fixed station to eras and events, becomes the final arbiter of time. Cut human experience lengthwise and time is the result. Astronomy measures the length of its various parts, thus making possible an orderly and intelligent view of history.

Astronomy is also a measure of space. The astronomer forgets your kilometers and reaches out to sun-distances and light-years. Here is a science that will lift its votaries out of the world of appearances and make of them poets and statesmen, artists and philosophers, setting them in a new world of contemplation and reverence, or wafting them onward over "a light-sea of celestial wonder."

Once the heart feels at home in the universe, the mind becomes incapable of fads. Other influences may have a similar effect, but the contemplation of star-law does most surely help one to recognize and avoid those shibboleths that estrange individuals and breed discord among races. I am persuaded that

no true astronomer would hang fate and the future on a text. In the olden time, when one was asked concerning "the anti-christ," the answer was, "Even now there are many of them." When a still greater was asked if Elijah would come at a certain juncture, he answered wearily : "Elijah has come already !"

This spacious view of life and nature lifts us above our vulnerabilities. When the eye catches a glimpse of a nebula thousands of light-years away, self dwindles to a vanishing point. Nevertheless, the contemplation of the generous proportions of this vast home in which we dwell makes us realize at last, that we, who are inhabitants of mansions of beauty and sublimity beyond our conception, must be, in our essential being and, therefore, in the illimitable promise of our future progress and achievement, far nobler than we have ever dared to dream.

Such is the science to which we invite your attention ; such the path into which we seek to entice your feet. Should you consent to enter that highroad, we feel sure that you will not return from your explorations and say : "I find the sky smaller and cruder, less interesting, significant and inspiring than you had led me to expect."

But with a heart pulsating to the rhythm of invisible forces, a soul attuned to the music of the great sphere-harmonies, and vision focussed to the fine definition of immeasurable reaches, we shall scrap our impedimenta, brush circumstances aside, ignore appearances that deceive only the blind of heart ; and going forth blithely on highroads of reality, shall never again be petty or puerile, or fall below the demands of our own imperial purpose.

Realizing that Life has caught this earth in the train of its trailing splendors, we shall see how fondly we have seized earth-things, clinging to them as a child to its toys ; we shall observe that Life sweeps everything it needs into its own great repertoire and bends them to ends of progress and power, but abandons to convenient gehennas all that is not — all that is merely handicap,— a drag on its lofty wing.

