

Chapter 1 - Introduction

It is sufficiently certain that Astronomy is one of the chiefest and oldest of the sciences; a study which amazes and charms everyone who comes to grips with it. It is a science vast, broad, deep, and sublime, the sort that it is possible in a volume like this merely to touch upon the edges of. The foremost astronomers are, as it were, only on the beach of this inexhaustible sea of knowledge, collecting shells; but they go on collecting, and from time to time their patience and their perseverance is rewarded by some new discovery. Laplace said on his deathbed that little indeed is that which we know, but what we do not know is immeasurable.

I fear there are some who suppose that Astronomy is a dry and terribly uninteresting subject, but believe you me, it is neither dry nor uninteresting, but entirely the opposite. I believe that every person is to some degree instinctively an astronomer, and it is surprising that the great majority of the inhabitants of the earth acquiesce to live in ignorance of that which there is to be learned about the shining worlds above. There are many who have strolled under the stars for 40, 60, indeed for 80 years, and have stared at them thousands of times, but without knowing anything about them, nor being able to distinguish one from the other. The sort of pleasure and delight, the sort of education and learning that such persons could have gained, had they been set upon the start of the path in the morning of their lives, to begin reading and studying a little of this blessed science! If they had gotten but a single grip on the end of the rope, they could have pulled themselves onwards from then on out. Thomas Carlyle was greatly distressed in his old days, that no one in the morning of his age had taught to him the names of the constellations, and made him to feel at home with the starry sky.

One of my chief intentions in this volume is to make good this defect, and to help everyone who reads it to avoid Carlyle's distress. I would trust that no one who follows this volume to its end will regret having made the effort. I trust as well that the study will prove to be a means towards expanding, to at least a certain extent, the horizon of the reader's ideas about the boundless expanse of Creation, and as a result will draw the reader closer to the Lord of the universe.

O, the wonders and splendid visions that are in the universe that the Great Creator has fashioned! Since the beginning myriads have looked up, on a clear, cloudless, moonless, starry night, in wonder and admiration upon the boundless expanses, and tried to imagine what those countless lights are that bespeckle the heavens above. Little holes to let through the eternal light behind – that's what I used to think as a child. The language of every child's heart is:

Twinkle, twinkle, little star,
How I wonder what you are!

Children are inquisitive creatures, and fond of the sublime and the mysterious. It must be that staring at the firmament above strikes some chord in the heart of a child (as well as in that of some folk a little older), else why do the stars enchant them so much? Ceiriog perceived this when he composed this:

O na bawn i yn seren –

Yn seren ar ael y ffurfafen,
Yn canlyn y lloer o amgylch y byd,
Yn seren fach wen – yn seren fach wen.

Would that I were a star –
A star on the brow of the firmament,
Following the moon around the world,
A little white star – a little white star.

It distresses my heart to think that the enchantment is often lost when the child becomes an adult. Instead of becoming lost, it should be developed. Let it be seized upon when it is awake. Let the child be taken by the hand, and guided onward to develop that faculty of admiration, wonder, and amazement, that has been planted so deeply in its nature. I shall never forget the thrill I felt permeating through me when, as a child in school in Llanybyther, I first saw an illustration of the planets revolving around the sun; nor that either a little later when I saw the great comet of 1882. And from then right up to the present that vital sensation has deepened continually.

In my own humble opinion, there is no branch of science that for expanding the horizons of the human mind may be compared even for a moment with this study of astronomy, and I do not hesitate to say that it would be of great advantage if astronomy were to be taught in the elementary schools of our country, as one of the subjects that every child should have some acquaintance with.

In every era the stars have fired the inspiration of the poet, and every astronomer is to some extent a poet, as every poet is to some extent an astronomer. Islwyn, more than any other of the poets of Wales, was fond of the stars, and his magnificent poem ‘Y Nos’ [‘The Night’] proves that fact:

Tyrd Nos ! a’th dorf o dystion; ym yn hoffi
Hyawdledd dwfn y sêr sydd gyda’r wawr yn tewi.
Y mae dy bur ddistawrwydd yn cyhoeddi
Fod acw Dduw a bydoedd tecach inni.
Nos yw y dydd sy’n cadw’r sêr o’r golwg,
A dydd yw’r nos sy’n gwneyd y nef yn amlwg.
Mae’r haul yn creu anffyddwyr o’i gyfodiad,
A thrwy y dydd y byd, y byd sy’n siarad.
O croesaw, Nos ! Sy’n gwneyd i’r byd ostegu
I ddragwyddoldeb trwy y sêr lefaru.

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Mae y sêr fel am siarad
Yn y nos am dŷ fy nhad;
Meddyliau uwch geiriau gaf
O’r sêr, ddwyfolwers oraf.

Come to me, Night, with your host of witnesses; I delight in
The deep eloquence of the stars that grow silent with the dawn.
Your pure stillness proclaims

That God is out there with worlds for us fairer still.
The day that keeps the stars from sight is night,
And the night that makes the heavens clear is day.
The sun makes unbelievers with its rising,
And through the day it is the world, the world that speaks.
O welcome, Night, who makes the world fall silent
For eternity through the utterance of the stars.

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It is as if the stars would speak
In the night about the house of my father;
Thoughts beyond words I get
From the stars, I brood upon a divine lesson.

Astronomy is chiefly a science to be studied in the night. The day is disadvantageous, for the fiery brightness of the sun has, to our sight, extinguished all the lights. They are there during the day, in the heavens, just as during the night, but they are invisible to us because of the sun's blazing brightness. I remember fondly the little childish riddle, one of the first that I ever learned, namely: What is

Y ddol las lydan, a mil o dda penchwiban,
A Jack coch capan, 'n eu troi nhw ma's ei hunan?

The broad green¹ meadow with a thousand flighty cows,
And red-capped Jack himself turning them out?

The answer:

The sky with its thousand lights, and the sun turning them all
out of the 'broad blue meadow' in the morning!

Shakespeare puts these words into the mouth of Lorenzo in the *Merchant of Venice*:

There is not the smallest orb . . .
But in his motion like an angel sings.

What can be more alluring than seeing the stars come out one by one across the sky after sunset? Milton in *Paradise Lost* (Books IV and V) suggests that Adam was the first astronomer. Adam admires the fair sun, and the lovely moon, and the bright stars that are the moon's retinue. "But why," whispers Eve, "why do they shine *in the night*? For whom was this beautiful sight provided when every eye is shut tight in sleep?" Then the first astronomer answers, "They do not shine in vain. Do not suppose, if there were no man, that the heavens would have no one to notice them, nor that God would be without praise, for

Ysbrydol anweledig fodau droediant lawr ein byd,
Fyrddiynau, p'run ai cwsg ai effro.

Millions of spiritual Creatures walk the Earth
Unseen, both when we wake, and when we sleep.”

Oh yes, astronomy is an old and noble study. Without it we would have lived as blind men in some dark cave, lacking understanding. But through it we perceive wonders, of the glory of nature as well as of human genius. One cannot but think it a great loss that so extensive a part of the population lives in large towns, where they have no need of the moon and the stars. Don't they have lamps on the streets, and electric light, and almanacs to tell everything?

Despite all that, during the last half century astronomy, as Chambers suggests, has developed astonishingly, not so much in connection with basic principles, as in details. This is to be attributed to the fact that increasing numbers of people of every class are taking a greater interest in the subject. The number and size of telescopes has grown, books on the subject have multiplied (as have their readers), more astronomical societies have been founded, more notice is paid to astronomical matters in the newspapers. Many a time, in situations and environments where it would hardly be expected, one meets with people who have fallen in love with astronomy. Sir Robert Ball mentions a person who wrote to him to announce that he had had enough of selling tea and sugar and cheese and butter, and that he felt that Nature intended him to be an astronomer. 'For,' he added, 'my mind will find no place to rest the soles of its feet, save on one of the worlds above.'

The chief difficulty I feel in discussing a subject so vast and many-sided is, how to treat it? It is possible to approach it descriptively, pictorially, as a natural physicist, theoretically, religiously, practically, or in a popular style. I have attempted to unite some of the above, and to make this volume as educational and yet as popular as is possible. As everyone will perceive, it is a great difficulty treating a boundless subject within the orbit of a bounded volume. Great abbreviation is necessary for the sake of the public generally. A sort of 'Astronomy for the Masses', with as few statistics as possible, has primarily been my aim. On the one hand, then, much will be found in this book for those who know next to nothing about the subject; but hopefully, on the other hand, the experienced reader will find something to ruminate on as well. Most of all, this volume is aimed at those with an eagerness to learn. It is something to *stir* the appetite; that appetite may be satisfied later on.

People are not always ready to acknowledge the *usefulness* of astronomy, but remember that astronomy governs the work and vocation of thousands of people, in many a circle, every day of their lives. Every maker of clocks and watches is indebted to astronomy. The *Nautical Almanac*, which has been published regularly since 1767, is arranged entirely in accordance with astronomy, and thousands of copies of it are published yearly by the government. Professor Newcomb says that if you set an experienced sailor on board a ship, with a covering over his eyes so that he could see nothing for days on end, yet with the ship travelling all the time, when you removed the covering – if the night were clear – he could tell within a hundred yards his position on the face of the ocean.

In concluding this chapter I would like, briefly, to make three further observations: (1) I have suggested that every child should have some amount of acquaintance with astronomy. One of the most brilliant sons of Wales, who is a great admirer of Mazzini,

tells me that that great thinker never tired of stating that astronomy should form part of the education of every child. A kind little suggestion, modestly and humbly, to the educational authorities. (2) The second observation is that it would, I believe, be beneficial if the National Eisteddfod would give a bit of room to astronomy in its program. (3) The third observation is, Wouldn't it be good for Wales to consider the profitableness of having a National Observatory? She has her National Museum, her National Library, and her National University. In general as regards the great universities of our kingdom, those establishments are not considered complete without observatories, together with a telescope worthy of them.

¹ Note: Welsh *glas* can refer to the green of a grassy meadow, to the blue of the day-time or dawn sky, and also (as Evans himself uses it in his book) to the clear darkness of the night sky – so the riddle works a lot better in Welsh than in English!