

Institute for Christian Teaching
Education Department of Seventh-day Adventists

**SEARCHING FOR THE CREATOR THROUGH
THE STUDY OF ASTROPHYSICS
AT AN ADVENTIST SECONDARY SCHOOL**

by
M. Ravindra Shankar
Education Director
South India Union of S.D.A.
India

**453-00 Institute for Christian Teaching
12501 Old Columbia Pike
Silver Spring, MD 20904 USA**

Prepared for the
27th International Faith and Learning Seminar
held at
Mission College, Muak Lek, Thailand
December 3-15, 2000

SEARCHING FOR THE CREATOR THROUGH THE STUDY OF ASTROPHYSICS AT AN ADVENTIST SECONDARY SCHOOL

INTRODUCTION

Christian education focuses on the formation of Christian persons. Given the Lordship of Jesus Christ in every aspect of life, we need educational programmes that teach young people to think Christianly and to be consistently Christian in all aspects of life. Such integration of faith and learning remains “the distinctive task” of the Christian school. (Holmes, 1987, P 8).

The single most concern of our Christian institutions is to integrate faith, learning and practice in every aspect of the curriculum and educating the students for eternity. The integration of faith and learning is a deliberate and systematic process of approaching the entire educational enterprise from a biblical perspective. Its aim is to ensure that students, under the influence of Christian teachers and by the time they leave school, will have freely internalized biblical values and a view of knowledge, life and destiny that is Christ centered, service-oriented and eternity-directed.

In order that students might relate everything in life and learning to their faith, all subjects in a Christian school must be taught from a Christian perspective. Students must recognize that the farthest reaches of any subject still lie within the realm of God’s truth. Such an educational program must be revelation-based, doctrinally correct and philosophically coherent (Beck, 1991). It must seek to foster in its students spiritual growth, ethical integrity, church relatedness, world consciousness and evangelistic outreach.

PURPOSE OF THE PAPER

Astrophysics is one of the fascinating areas in the field of Science. It is the study of the Planets, Satellites, Stars, Galaxies, Black Holes, Quasars, Pulsars and other heavenly bodies. Man has made many attempts to know about these heavenly bodies. But with his limited knowledge and technology he was able to unearth only a fraction of the universe, which is so marvelous. He is yet to understand many more mysterious things of the universe.

The whole universe is created very intelligently. When you look at the way the Planets are hung in the universe, the rotation and revolution of the Planets and Satellites, the rings around Saturn, the constitution of galaxies with millions and billions of Stars, the intense gravity of Black Holes and many more things in the universe show how intelligently and marvelously they are made. They reveal the supremacy and handiwork of God.

Astrophysics is a part of the curriculum in the high school and senior High School levels. Unfortunately students in the high school and senior high schools march out of their institutions without knowing the true Creator and His creation. Therefore an attempt should be made to integrate faith and learning in teaching astrophysics. This involves a great deal of

more than just giving lip service to the blending of religion with the subject. It must be more than merely a lofty statement in the students handbook. Thus the main purpose of this paper is to help the teachers to find out the ways and means of integrating faith and learning in teaching astrophysics. While teaching astrophysics the students should be made to understand and appreciate :

1. God's supremacy
2. God's creative handiwork
3. God's infinite knowledge
4. God's intelligent design

Thus teaching astrophysics should help the students to **search for the true Creator in the universe through the study of astrophysics.**

ASTROPHYSICS AND SCRIPTURE

God has two great books of inspiration. The first we call the Holy Bible; the other, the book of nature, of which the Starry heavens are an important chapter. The Bible, in whole or in part, is available in over a thousand languages, but God's writing in the Stars is open "to every nation, and kindred, and tongue, and people." Of all sciences, astrophysics makes the most nearly universal appeal. If it is not for the Bible, our conceptions about astronomy would be limited, even though we might be aided by all the means and methods of modern astrophysics. In the Bible, our vague guesses and groping questions are answered by the most daring of revelations, the grandest of delineations, the most sublime of statements.

The Bible is astronomically correct. New telescopes which can discover heavenly bodies which are millions of miles away have destroyed false systems of the past. During the centuries that the Bible was being written many astronomical propositions were also put forth. New telescopes and spectroscopes have brought havoc to these ancient systems but not so to the Bible. It is astronomically correct and almost every new discovery clearly indicates the Bible's marvelous accuracy.

Teachers with this background, should convey to the students that true science complements and contributes to the astronomical assertions of the Bible. There can be no controversy between true science and the Bible. Both are manifestations of Divine Truth. God is the source for both the true science and Scripture. The science which do not agree with the Scriptre is not true science. It is only secular science.

God speaks and creates. Thus, His creation or nature reveals Him; and His speech, the Bible, is likewise His word. God's two books, nature and the Bible, should agree because they have the same Author. The fundamental truths expounded by true science

(nature) and biblical assertions concerning the nature of the universe can therefore be expected to harmonize with each other. The Bible always guides the mind more deeply into the wonders of true science. Each is the handmaid of the other. {"True Science makes more brilliant the gems of Holy writ"}. In the Bible we find great principles of truth; in nature we find facts that explain, illustrate, and make clear the truth of the Bible.

Therefore the teachers should bring out biblical evidences from the Scriptures and show that facts in modern astronomy explain, illustrate and make clear the astronomical assertions of the Bible and that, the two - Bible and the science of astronomy - are essentially in harmony. A few of them are given below:

1. **Isaiah 40:26** – “Lift up your eyes on high, and see who has created these things, who brings out their host by number; he calls them all by name, by the greatness of His might and the strength of His power; not one is missing.

This verse will help the teachers to project that the study of astrophysics is the study of the heavens, is a study that reveals the greatness and goodness of God.

2. (a) **Psalms 19:1** – “The heavens declare the glory of God; And the firmament shows His handiwork.”
 (b) **Psalms 89:5** – “And the heavens will praise your wonders, O Lord. Your faithfulness also in the congregation of the saints.”
 (c) **Joel 2:30** – “And I will show wonders in the heavens and in the Earth: blood and fire and pillars of smoke.”

These verses will help the teachers to inculcate in the students the idea of the wonderful works of God and His handiwork. They can be told how the scripture, reveal the marvels of the universe. As students behold these marvels they should be led to praise the Creator and the Master architect.

3. (a) **Hebrews 1:10** – “And you Lord, in the beginning laid the foundation of the Earth, and the heavens are the work of your hands.”
 (b) **Gen. 1:1** – “In the beginning God created the heavens and the Earth.”

These verses clearly emphasizes that God is the **Creator**. He is the one who has created the heaven, the Earth and the whole universe. God is supreme.

4. **I Cor. 15:41** – “There is one glory of the Sun, another glory of the Moon, and another glory of the Stars; for one Star differs from another Star in glory.”

With this verse, the teacher can explain how Scripture reveal about the characteristic features and the physical nature of the heavenly bodies, like Sun, Moon and Stars and how they differ in size, shape, color and intensity. No two Stars are alike. It also explains that the Sun differs from the Moon in its light.

The Sun is a self-luminous body, whereas the Moon is a non-luminous body. So we see the astronomical accuracy of the Bible. There is one glory (brilliance) of the Sun, another glory of the Moon and another glory of the Stars.

5. (a) **Jeremiah 31:37** – “Thus says the Lord: if heaven above can be measured, and the foundations of the Earth searched out beneath, I will also cast off all the seed of Israel for all that they have done, says the Lord”.

(b) **Job 22:12** – “Is not God in the height of heaven? And see the highest Stars, how lofty they are!”

These verses talk about the infinitude of space. Here it is suggested that the heavens cannot be measured. It is beyond the power of man to do so. Astronomers use light-years as the unit to measure the distance between the heavenly bodies instead of miles since they are too small. One light year is the distance travelled by a light ray in 1 year at the velocity of 300,000 km/sec. For Ex: Alpha Proxima the nearest Star to the Earth except the Sun is 4.3 light years away from us. That is, light takes 4.3 years to reach Earth from this Star. The Great Nebula in Andromeda is at a distance of 600,000 light years. This shows how huge the universe is. This is really inconceivable to the mind of man.

6. **Gen 15:5** “Then He brought him outside (speaking of Abraham), and said, Look now toward heaven, and count the Stars if you are able to number them”.

This verse declares that the Stars are innumerable. This great truth revealed in the Bible is only now beginning to be appreciated by modern astronomy. It is told by the astronomers that our Milky Way galaxy is composed of 40-50 billion blazing Stars. The Hercules cluster is composed of about 1 million Stars. The spectroscope has come to our aid in the counting of the Stars. Think of it – millions and billions of Stars in the universe.

7. **Psalms 147:4** – “He counts the number of the Stars, he calls them all by name”.

This verse clearly talks about the power of God. He formed the heavens and He scattered the depths of space with the glories of uncounted Suns and the wonders of attendant Planets and Satellites. They are beyond the comprehension of man, but God can count them. Great is our Lord, and His power; His understanding is infinite.

8. **Isa. 45:18** “For thus says the Lord, who created the heavens, who is God, who formed the Earth and made it, who has established it, who did not create it in vain, who formed it to be inhabited.”

This verse clearly speaks that He made the Earth to be inhabited. He made all the conditions to be favorable for life to exist.

These are only few evidences taken from the Holy Scriptures. Many more evidences can be brought out by the teachers to show that the Bible and the science of astronomy are in harmony with one another.

ASTROPHYSICISTS AND THE CREATOR

It has been said that “the undevout astronomer is mad!” – mad because, with such a spectacle before him, he is still undevout. Therefore some devout thoughts and feelings about the Creator should be inculcated in the students while teaching astrophysics. There are many famous scientists and astronomers who view the subject in this attitude of faith and reverence. These Scientists have seen God in astrophysics. They have seen God and His handiwork in every bit of His creation. Quotations from some of these scientists would bring a positive influence upon the students. Some of them are given below:-

- I. **William Herschel**, one of the greatest of astronomers, has said, “All human discoveries seem to be made only for the purpose of confirming more strongly the truths that come from on high and are contained in the sacred writings”.
- II. **General Mitchel**, astronomer, has spoken words that should never be forgotten: “If there be anything which can lead the mind upward to the omnipotent Ruler of the universe, and give to it approximate knowledge of His incomprehensible attributes, it is to be found in the grandeur and beauty of His works.
- III. **Joel Dorman Steele**, quotes “The great dome of the sky, filled with glittering Stars, is one of the most sublime spectacles in nature ---- some shine with a vivid light, perpetually changing and twinkling: others, more constant, beam softly and tranquilly upon us: while many just tremble into our sight, like a wave that, struggles to reach some far-off land, dies as it touches the shore. “In the presence of such weird and wondrous beauty, the tenderest sentiments of the heart are aroused. A feeling of awe and reverence, of softened melancholy mingled with a thought of God, comes over us, and awakens the better nature within us”.
- IV. **Henry White Warren** has said “ --- The common authorship of the worlds and the word becomes apparent; their common unexplorable wealth is a necessary conclusion”.
- V. **J. Kepler**, a giant of faith and science, says – “I had the intention of becoming a theologian – but now, I see how God is, by my endeavors, also glorified in

astronomy for the heavens declare the glory of God.” “Together, with the Holy Scriptures, came the Book of Nature.”

ASTROPHYSICS AND THE CREATOR

“Lift up your eyes on high, and see who has created these things, who brings out their host by number; He calls them all by name, by the greatness of His might and the strength of His power; not one is missing.” Isa. 40:26

This is God’s invitation to study astrophysics. The study of astrophysics elevates and broadens the mind. It arouses and directs our imagination towards the true Creator. It gives man a truer idea both of himself and of his Creator.

When we find that the Stars are at vast distances from us, and that they are innumerable, spangling the heavens with jets of radiance, we are in better condition of mind to realize the glory of Him who brings “out their host by number” calling “them all by names”. And viewing them, as they move in their orbits, we shall perceive back of them the power of God that forever keeps them as they are”, by the greatness of His might, for that He is strong in power...”

The study of astrophysics provides opportunity for the teachers to point to the students the following attributes of the Creator:

- A. **His Glory**: To understand His glory, examine the interminable range of Suns and systems, which crowd the Milky Way. Multiply the hundred millions of Stars which belong to our own “island universe” by the thousands of these astral system that exist in space, within the range of human vision, and then we may form some idea of the infinitude of His kingdom. Let us examine the scale on which the universe is built and try to comprehend if we can, the vast dimensions of our Sun. Stretch outward through His system, from Planet to Planet and circumscribe the whole within the immense circumference of the solar system. This will be but a single unit out of the myriad of similar systems. Take the wings of light, and flash with impetuous speed day and night and month and year, till youth shall wear away, and middle age is gone, and the extreme limit of human life has been attained; count every pulse, and at each speed on our way a hundred thousand miles; and when a hundred years have rolled by, look out, and behold! the thronging millions of blazing Suns are still around us, each separated from the other by such a distance that in this journey of a century we left only half a score behind us. That is His glory.
- B. **His Existence**: To have an idea of God’s existence, go to the astronomer, and request him to lead you in one of his trips through space; and as he sweeps upwards from object to object, from galaxy to galaxy, remember that the light

from those filmy stains in the deep pure blue heaven, now falling on our eyes, has been travelling through space for unnumbered years.

- C. **His Omnipotence**: To have the knowledge of the omnipotence of God, weigh the Earth in which we dwell, then count the millions of its inhabitants that have come and gone for the last 6000 years. Unite their strength into one arm and test its power in an effort to move this Earth. It could not move the Earth a single foot in a 1000 years; and yet under the omnipotent hand of God, the Earth rotates on its own axis and revolves around the Sun in perfect order. But this is a mere atom; the most insignificant point among His innumerable worlds. At His bidding every Planet, Satellite, comet, and the Sun itself, fly onwards in their appointed courses. His single arm guides the millions of sweeping Suns, and around His throne circles the great constellation of unnumbered universes.
- D. **His Omniscience**: In order to comprehend the idea of the omniscience of God, let us remember that the highest pinnacle of knowledge reached by the whole human race, by the combined efforts of its brightest intellects, has enabled the astronomer to compute approximately the perturbations of the Planetary worlds. He has predicted roughly the return of half a score of comets. But God has computed the mutual perturbations of millions of Suns, and Planets and comets and worlds without number, through the ages that are passed and throughout the ages that are yet to come, not approximately, but with perfect and absolute precision. The universe is in motion-system rising above systems, cluster above cluster, nebula above nebula, -- all majestically sweeping around under the providence of God, who alone knows the end from the beginning, and before whose glory and power all intelligent beings, whether in heaven or Earth, should bow with humility and awe.
- E. **His Wisdom**: In order to gain an idea of the wisdom of God, let us look at the admirable adjustments of the magnificent retinue of Planets and Satellites, which sweep around the Sun. Every globe has been weighed and poised, every orbit has been measured and bent to its beautiful form. The laws fixed by the wisdom of God, though they permit the rotation and revolution of the system, never introduce disorder, or lead to destruction. All is perfect and harmonious.

ILLUSTRATIONS FOR THE INTEGRATION OF FAITH & LEARNING IN TEACHING ASTROPHYSICS

Integrating faith and learning is appropriate in every subject commonly taught in the elementary, secondary and higher secondary curriculum. All subject areas involve ideas, attitudes, issues, thought processes or moral values. In every subject the teaching methods used tend to create either Christian or non-Christian values, attitudes and life styles. But emphasis should be given to create the Christian values and attitudes.

Integrating faith and learning in teaching astrophysics is a complicated process and it involves high intuition on the part of the teacher. The teachers should be intelligent and creative to use various learning activities to integrate faith and learning.

The following examples and illustrations will help the teachers to project the various attributes of the Master Architect, and direct the minds of the students toward the Creator.

A. God's supremacy

God is supreme. He is high above all the things in the universe. He is the Creator of all the things in the universe. His glory can be seen everywhere in the universe. His handiwork can be seen everywhere. The following discoveries and information illustrates the supremacy of God.

The Planet Earth where we dwell is one among the 9 Planets in the solar system. This is the only Planet where the conditions are favorable for the living beings to exist. It spins on its own axis in 24 hours and revolves around the Sun in 365 days. The day and night occurs due its rotation on its own axis and the seasons occur due to its revolution around the Sun. Its diameter is 12,756 km. and it is about 149.6 million km from the Sun. The mountains, the valleys and the landscape is so beautifully and marvelously made. Moon is the only Satellite of the Earth.

The other Planets of the solar system have their own distinctive features. Mercury is the closest Planet to Sun and only 50% larger than our own Moon with no air or water. It just takes 88 days to go around the Sun and whereas it takes 58.7 days to rotate on its own axis. It is so near to the Sun that its day time side is heated to a temperature of 350 °C, hot enough to melt tin and lead. But, because there is no atmosphere to hold the heat in, temperature on mercury's night side fall to 170 °C below freezing.

The other Planets of the Solar System have their own distinctive features. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune & Pluto differ from one another in terms of their constitution & position in the Solar System. The other members of the Solar System like Meteors, Asteroids & Comets too have their own distinctive features. All these members revolve round the Sun in their orbit. It is believed that the Solar System encompasses a circle upto a radius of 7000 million miles.

Sun, around which all the Planets are revolving is another of God's wonder in the universe. It is a Star and a glowing ball of gas. It is about 93 million miles from the Earth and about 865,000 miles in diameter. It would take an aviator, flying at 200 miles an hour, more than 53 years to reach the Sun. It would take 1.3 million Earths to make a globe as large as the Sun. If the Earth were to swell to the size of the Sun, and men were to increase in proportion, an average sized man would be 625 feet tall. It takes 8.3 minutes for the light to travel from Sun and reach Earth at the speed of 300,000 km/sec. Strange spots called "Sun spots" appear on the Sun at times,

remaining for a few hours, days, or even months. These spots are from 50,000 to 180,000 miles across, so that 20 worlds like ours could be laid in line across one of these spots without hiding it. These spots are believed to affect weather and radio reception on Earth.

If we believe that the solar system is so huge we are mistaken. And if we think that the solar system is so fascinating we are mistaken again. Let us peep out of the solar system and see how much more fascinating things are there in outer space. Sun and the members of the Solar System forms a very minute part in the milky way galaxy. A galaxy is a family of millions & millions of Stars like Sun. It is believed that 100 million of these Stars are equal to our Sun in brightness. This Star city is shaped like a wheel. The center of our Star city is about 40,000 light years away, so remote from us that we cannot even see its brightest Stars with our unaided eyes, which at best can see Stars whose light, travelling at the rate of 300,000 km/sec. takes 3,000 years to reach us. We must not forget that this Star system of ours is but one among hundreds, thousands, and millions of other Star systems, which form other milky way island universes, galactic systems, spiral nebulae, gigantic Star cities and flaming constellations of God's infinite and glorious creation.

Thus there are millions and billions of Stars in the universe. They are infinite in number as far as human comprehension is concerned. There are Stars which are much brighter and bigger than the Sun. The Star Sirius is 27 times brighter than Sun. There are Stars which are dwarfs and giants. There are Stars with birthdays and death days. There are Stars, which explode and "die" giving rise to new Stars. There are Stars with different colors and are kept millions of miles apart. It takes many years for a light ray to travel from one Star to another. It is fascinating to know that the light rays from many Stars have not yet reached the Earth. They are still on the way.

So enormous is the universe. It is beyond our comprehension to understand the size of the universe. Thus astronomy reveals more and more of the greatness of the universe, so it reveals more and more of the greatness of God, the Creator. The Creator is greater than his creation. The more we learn of the Starry universe, the more understandingly can we exclaim, "The heavens declare the glory of God, and the firmament shows His handiwork". ---Ps. 19:1

Astronomers have sustained the teaching of the Scripture that the universe is one of universal order. A universe of law leads us to the Lawgiver. The Holy Scripture has revealed the truth of the vastness of the universe and its revelation of the majesty and supremacy of God.

B. God's Marvelous Handiwork

The creative network of God is so marvelous and very fascinating. The following are some of the few illustrations to show the fabulous handiwork of God in the creation of the universe.

- (i) Each heavenly body in the universe is different from the other. They have their own distinctive features. Bible says –“There is one glory of the Sun, and another glory of the Moon, and another glory of the Stars; for one Star differeth from another Star in glory.” I Cor. 15:41

This fact is astronomically true. The Stars differ in their size, color, luminosity (brilliance) etc. The Stars Antares, Aldebaran, Betelgeuse are red in color. Vega is bluish in color, whereas Sirius and Procyon are white and Capella shine with yellow light. The Stars also differ in their brilliance. For instance, there is Rigel, a brilliant white Star in the constellation of Orion which is 14,000 times more luminous than our Sun. Sirius is 27 times brighter than our Sun. At the same time we see that the Sun and the Stars differ from Planets and Satellites. The Sun and Stars are self-luminous bodies whereas the Planets and Satellites are non-luminous bodies.

- (ii) Our Milky Way galaxy seems to be almost 100,000 light years from one edge to the other and 15,000 - 20,000 light years thick and yet of the 50 billion Stars which it contains, only 6,000 can be seen with the unaided eye. The whole galaxy is turning like a giant pinwheel, so big that it requires almost 200 million years to complete one turn.
- (iii) There is something very interesting about Sirius, which is one of the three Stars in the belt of Orion. More than 200 years ago, the great English astronomer, Halley, found that instead of being stationary, this Star has slow motion with respect to other Stars. A century later, a German astronomer, Bessel, found that Sirius moves in a slightly wavy path, which he was sure was caused by some unknown companion. He was sure that Sirius and this unknown Star were revolving around a common center of gravity, which moves in straight line with uniform speed. In 1862 Clark, an American telescope maker, discovered this faint companion while he was testing a new telescope. It was found that the distance between the pair was about 700 million miles or about 8 times the distance of the Earth from the Sun. This companion to Sirius is so small that it can hardly be seen. It is very hot and very heavy, probably 800 times as dense as any substance known on Earth - at least, that is the belief of the astronomers.
- (iv) The biggest Star that we can see in all the sky is our own Sun, and what a mystery it is! In spite of all the study that has been given it, it is still a profound mystery. It has been said that the Sun sheds enough heat on Earth every day to melt a layer of ice 424 feet thick, and that every day Sahara desert receives 3 times as much energy from the Sun as is contained in all the coal

that is burned in the whole world in a year. The Sun is about 93 million miles from the Earth. An aviator in an airplane travelling at 600 miles an hour with out stopping for fuel or sleep, rest or repairs, would take over 17 years to reach the Sun. If the Sun were only a mile away, its heat would burn every thing on the Earth as quickly as feathers are consumed in a red-hot furnace. Even the sea would be instantly dried up and all the rocks and minerals melted, and the Earth itself transformed into gas.

- (v) Mars has two Satellites, Deimos, the outer one and Phobos the inner one. These Moons are very small. Phobos is 10 miles in diameter and Deimos is 5 miles in diameter. The interesting fact is that Phobos goes around Mars faster than the Planet rotates on its axis. If there are inhabitants on Mars, they see it rise in the west instead of in the east two or three times a day. The other Moon Deimos moves a little more slowly and it rises in the east and sets in the west.
- (vi) If it were possible to travel to the Moon for a visit, we would find a number of thrilling surprises awaiting us. We would find that we would weigh only 1/6 as much as we do here on Earth. If we were going to jump, for to be able to jump 4 feet high here would mean we would be able to jump 24 feet high there and land without breaking bones. We need to be careful in throwing a ball, for it might go so far we would never find it again. This is quite marvelous.
- (vii) The velocity of a rifle bullet at the muzzle of the gun is 3,500 feet a second. But how incomprehensible is the speed of the heavenly bodies! Our Sun, dragging his great train of all the Planets, asteroids and Meteors with him as if he were hauling a ponderous trailer 4 billion miles long, sweeps through the skies 65,000 feet a second or more than 18 times as fast as a rifle bullet. Yet we never feel a jerk nor become sea sick when we swing around the turns ! Surely this is one of the wonders of God.
- (viii) Other marvelous creations are PULSARS and QUASARS. The Pulsars are rapidly rotating neutron Stars, which give out a flash of radiation like a lighthouse beam each time they turn. Typical Pulsars flash once every second or two, the fastest of all, at the center of the Crab nebula flashes 30 times a second.

Quasars are objects, which are very, very intensely luminous bodies placed far off the universe. They are millions of times brighter than Stars. Many Quasars estimated to be at least 10,000 million light years away. Most of the Quasar's energy comes from a small area at its heart and it is these brilliant centers that make Quasars visible over such enormous distances.
- (ix) Black Holes are more exotic objects than any other objects in the universe. These are predicted to be formed by a super nova explosion. These are objects

with intense gravity so much so that nothing can escape not even light. They become invisible. Such an object may seem absurd, but the theory of gravity predicts that Black Holes should occur. The most astounding thing about them is that, at their center, the Star continues shrinking until it shrinks itself down to nothing. It has ceased to exist, although its intense gravitational field remains around it. What a marvelous creation indeed!

So, in many marvelous ways, the Earth, the Planets, Sun, Stars and galaxies are teaching us. They are speaking to every one who is willing to listen every day, every minute, every second and declare –“we are the handiwork of God.”

Many more illustrations can be brought forth to show the creative network of God.

C. God's infinite knowledge

God is the source of all knowledge and all the laws that are present in nature. Man is the created being of the Creator. He is yet to find out the answer to many mysteries of the universe. This shows that God is above all the things in the universe. His knowledge is infinite. The following illustrations provide evidence that He is the source of all knowledge and it is infinite:

(i) What holds the heavenly bodies in their paths in the universe. They are upheld by a power which scientists call 'gravitation'. No man on Earth knows what gravitation is. The law of gravitation discovered by Sir Isaac Newton is one of the greatest achievement in the field of science. Although Newton gave the name 'gravitation' to this power, he did not really know what it was. This mighty power which holds the universe together is revealed in Col 1:16,17 – “By Him were all things created --- and He is before all things, and by Him all things consist”. Science can go no further than this today. The law of gravitation is merely a description of how this mysterious power works.

(ii) Earth is the only Planet in the solar system where the conditions are favorable for life to exist. This is the only Planet where liquid water exists, and water is vital for life to exist. What made the Earth to have all conditions favorable for life to exist? Why not other Planets?

Isa. 45:18 says – “For thus says the Lord, who created the heavens; who is God, who formed the Earth and made it, who has established it, who did not create it in vain, who formed it to be inhabited: I am the Lord, and there is no other”.

(iii) One odd fact about Venus is that it rotates on its axis from east to west instead of from west to east like the other Planets. It takes a longer time to spin on its axis than it does to orbit the Sun. It takes 224.7 days to go around the Sun and

243 days to go on its axis. The reason for this remarkable state of affairs remains unexplained.

- (iv) Some scientists declare that the Sun is losing by radiation 4 million tons of its own substance every second. One great astronomer states that the Sun is pouring out light and heat so fast that it is radiating away its mass at the rate of 133 trillion tons a day. At this rate it would take 50 million years for the Sun to radiate as much of itself as the mass of the Earth. And even at that rate, it would not lose 1% of its own stupendous mass until the lapse of about 150 billion years. Though the thermonuclear reactions are the source for this tremendous energy, science knows very little about the exact cause of the Sun's heat. It is a mystery. We only know that it is a part of God's tremendous universe.
- (v) There are many mysterious things about the Orion nebula. A photographic study of this nebula has shown that this great flaming cloud of Stars and cloudy mystery in the sword of Orion seems to contain the mouth of a cavern, a deep opening, receding into mighty distances beyond. Astronomers tell that the opening of this shining cave would be around 16,740 billion miles wide. This is an enormous width of the colossal cavern. Some say it is 19 trillion miles wide and 51 trillion miles deep. This is the famous open space in Orion. Although some have thought that this mammoth cave of supernal splendor, might be the opening to a more glorious region. It is a mystery till to day.

These are only a few illustrations, and many more can be brought forth to show the incomprehensible knowledge of God.

D. God's Intelligent Design

When we take a journey through the solar system and to the outer space, we come to know that the universe is intelligently designed. God's wisdom can be seen in every bit of his creation. The following few examples illustrate the intelligent design of God.

- (i) Earth lies at just the right distance from the Sun for water to exist in liquid form. Were Earth much closer to the Sun it would be so hot that water would boil as would happen on Venus. If it were further away water would freeze as happens on Mars. Liquid water is vital for the existence of all forms of life on Earth.
- (ii) Look at the way the Sun, Planets, Satellites and other members of the solar system are placed in the universe. There are no pillars or rocks or something to rest upon. Yet they are rotating on their own axis and revolving round the

Sun with nothing about them, around them, under them to support them. They are held by a force called 'gravitation'. But they are so intelligently placed that they do not collide with one another. The gravitational force is so precise, perfect and accurate for each member of the solar system that each moves in its own orbit in perfect harmony.

Job 26:7- "He stretches out the north over empty space: He hangs the Earth on nothing."

- (iii) Think of the terrific centrifugal force of the Earth, which whirls around its axis at 1000 miles an hour, and yet the things on its surface do not fly off into space. The mysterious power of gravitation holds everything to the Earth's surface. Even the atmosphere is held to the Earth by gravitation, which shows that the atmosphere has weight.
- (iv) Quite often we see "Stars" falling in the clear night sky. Actually they are not Stars. They are Meteors, and also called as shooting Stars. Meteors sometimes sneak into the gravitational power of the Earth and approach the Earth with great velocity. If they were to fall on the Earth with such velocity, they would cause lot of damage to the life and property on Earth. Fortunately God has made a provision to protect us from too many collisions of the Meteors by creating the atmosphere. Meteors Start burning the moment they strike the Earth's atmosphere and most become ashes before they could reach the Earth. A great design indeed.

The Asteroids which are also known as Planetoids, are revolving round the Sun as cosmic fragments. They are found in the wide gap between the orbits of Mars and Jupiter. These fragments are prone to get attracted to the Earth. But the presence of Jupiter whose gravitational force is much much larger than that of the Earth, attracts these debris whenever they sneak out of their path into the Planet. Thus saves the Earth, its life and property from destructive collisions. Therefore the presence of Jupiter which is rightly placed in the Solar System is a great boon to the Earth.

- (v) We enjoy the experience of day and night and the various seasons on Earth because of the orderly rotation and revolution of the Earth.

Many were illustrations can be brought forth by the teachers to explain the intelligent design of God.

**LEARNING ACTIVITIES FOR THE INTEGRATION OF FAITH AND LEARNING
IN TEACHING ASTROPHYSICS**

Integration of faith and learning in teaching astrophysics is not a simple task. To unite spiritual truth with a study of the science of astrophysics requires careful planning. It cannot be achieved fully within the four walls of the classroom. The following learning activities will enhance the integration of faith and learning.

1. Arrange a visit to various institutes of astrophysics—
 - i. To interact with astrophysicists and astronomers and discuss issues like the Big Bang Theory, the origin of the Universe, etc. with reference to Scripture.
 - ii. To get to know the current discoveries and developments in the field of astrophysics and study the same with reference to Scripture.
 - iii. To go through the literature, articles and reports present in the institute and compare with Scripture.
2. Arrange a visit to various astronomical observatories—
 - i. To get to know the various instruments like telescope, spectroscope etc used in the study of astrophysics.
 - ii. To watch the night sky and observe the movement and constitution of Planets, Satellites, comets, Stars, galaxies and other heavenly bodies and appreciate the handiwork of God.
3. Encourage students to make a list of issues that are not yet answered by astrophysics and discuss with them
4. Invite resource persons to present papers on various aspects of astrophysics and try to integrate the same with faith as a follow-up activity.
5. Conduct seminars, symposiums, workshops, etc connected with astrophysics and share the views of the Scripture.
6. Collect materials like photographs, pictures etc which could be used for illustrating talks.
7. Examine the principles and purposes of creation of the universe as portrayed in the Bible. Discuss these in small groups.
8. Discuss the characteristics of God with reference to the study of astrophysics in small groups.
9. Encourage students to make a list of Bible verses, which are applicable to the study of astrophysics.
10. Arrange a field trip to the places of scientific interest specially astrophysics.

These are some of the learning activities suggested to achieve the objects of integrating faith and learning. However the teachers are at liberty to develop many other activities to achieve

the desired goal. But in as many learning activities as possible, the students should step beyond the classroom walls and out into nature. In order to understand the messages of the sky, however the students must learn to be observing and inquiring. He must acutely develop his senses, collect and retain the information around him. He must have first-hand experiences in measuring, observing, analyzing, and classifying the various aspects in astrophysics. Such awareness is to be awakened by the Christian teacher.

RESULTS OF INTEGRATING FAITH AND LEARNING IN TEACHING ASTROPHYSICS

1. As one views the broad spectrum of universe, divine truth should begin to reveal itself to the students. They will begin to see the footprints of God in the order and design of the intricate systems of the universe. They will discover meaning and purpose. Soon an awareness will arise that there is a cause for every thing found in the universe. The mind can then be led to inquire, "Is there not a great first cause"? In the search for this cause, the students may be guided to behold Jesus Christ, the Alpha and the Omega---the beginning in the creation that reaches to the end in salvation. God will be seen as the primary cause, the controller of events and the Sovereign redeemer. The dependence of all creation upon the Creator will be understood.
2. The students will come to recognize nature as an expositor of God's character. God's love, His power and His laws will be seen evidenced in the natural world. The value of obedience, trust, simplicity and the ministry of love to others may be discerned. God's loving thought, His skill and omniscience will be vindicated. Through faith, the students will see the hand of God continually working in nature for the good of man amid chaos which sin has brought. They will be led to realize that all that is true and right is consistent with God in all of its manifestations.
3. Through the observation of the universe, the students may ask the purpose of what they see. They may then perceive the laws of God at work in the universe. They may also notice that breaking the laws would result in ruin, as we may see in the problem of pollution. A first-hand experience in the natural environment will thus lead to a clearer perception of the complexity and interdependence of God's creation and will create a concern for the natural world and man's effect on it.
4. The students will also be in a position to identify the attributes of God in the study of astrophysics. His supremacy, His glory, His existence, His omnipotence, His omniscience, His wisdom can be perceived by the students.
5. The students will also be in a position to identify and appreciate the creative network of God and recognise the intelligent design of the Creator.

6. The students will also understand that true science complements and illustrates to the astronomical assertions of the Bible. The Bible and science of astronomy are essentially in harmony with one another.
7. The glory of God seen in the creation of the universe will develop faith and reverence in the true God.
8. The students will be in a position to apply to their personal experience the lessons derived from the study of astrophysics.
9. Students will experience the increased happiness that can be found in the study of astrophysics in relation to Holy Scripture.
10. Students will reaffirm a personal commitment to the Creator through the study of his created works.
11. Students will develop a lifelong interest in the study of astrophysics in relation to the Holy Scripture.
12. Students will become observing. They observe the spiritual meaning in nature. Their souls will be invigorated, their character refined, their spirits awed and their mind will be filled with peace. They will be brought into intimate relationship with the Divine.

True integration , however, occurs when faith and learning meet and merge, when they fuse to become the pervasive, driving force in Christian education. This implies that whenever learning takes place, faith must be exercised through an endeavor to see the fullness of life from God's perspective. Further more, faith itself implies a commitment to grow in knowledge (2 Pet 3:18, Eph 4:15). It is not sufficient to merely stand for the truth. One must walk progressively in the truth. (Ps 86:11, 3 John 4).

SUMMARY AND CONCLUSION

As we look at the awesome sky, we realize that every new discovery of astronomy extends its incomprehensible vastness. Every time science makes a new discovery it raises new questions. Every extension of the known has increased the boundary, which separates it from the unknown. As the power of the modern telescopes increases, we look out into immensity, we view through immeasurable distances incomprehensible spheres in incalculable numbers moving with inimitable precision through illimitable space.

“ The world’s greatest debt to astronomy”, says Prof. Simon Newcomb, “is that it has taught us what a great thing creation is, and what an insignificant part of the Creator’s universe is this Earth upon which we dwell”.

No wonder the inspired Psalmist declared –“His greatness is unsearchable”. – Psalm 145:3. The greatness and majesty of the Creator are revealed in the greatness and majesty of His creation. “Come and see the works of God”, --- is the invitation of Psalm 66:5. **This is the invitation of astrophysics.**

Thus, a sincere attempt has been made in this paper to integrate faith and learning in teaching astrophysics. Many specific examples and illustrations have been taken into consideration. An attempt has been made to guide the teachers to inculcate in the students the true knowledge of God while teaching astrophysics, and also to stimulate the students to develop interest in the subject and to know the creative network of God. While it is important to have constructed a general plan for this integration venture, there should not be a regimented inflexible protocol for either the teachers or the students. Sometimes it is best to let the students discover the marvelous creation rather than simply inform them. Let them open the windows of heaven and encourage themselves to think of their own lessons and insights.

SELECTED BIBLIOGRAPHY

1. Reed, Lucas A. *Astronomy And The Bible*. Pacific Press Publishing Association,
2. Voice Of Prophecy. *The Stars Talk*. Pacific Press Publishing Association
3. Rich, J. Walter. *The Message Of The Stars*. Voice of Prophecy
4. Ramm, Bernard. *The Christian View Of Science And Scripture*. W M. B. Eerdmans Publishing Company
5. Rimmer, Harry. *Modern Science And The Genesis Record*. W M. B. Eerdmans Publishing Company
6. Richards, H. M. S. *The Stars And The Bible*. The Voice Of Prophecy
7. Nathan, K. S. *The Story Theory Of Humanity*. Oriental Watchman Publishing House
8. Ridpath, Ian. *Hamlyn Encyclopedia Of Space*. The Hamlyn Publishing Group Ltd.
9. White, Ellen. G. *Counsels On Education*. Pacific Press Publishing Association
10. Tiner, John, H. *Johannes Kepler: Giant of Faith and Science*. Mott Media, Michigan
11. Taylor, John Wesley *Instructional Strategies for the integration of Faith and Learning*, a presentation at 27th International Faith and Learning Seminar, December 5th 2000, Thailand.