(Students study part three or part four)

PART THREE: C*URRENT ISSUES FOR RELIGION AND SCIENCE: ORIGINS*

Syllabus Aim	- To develop an awareness of the changing nature and methods of the scientific and theological enterprises - To examine some key moments in the history of the relationship between religion and science - To examine some of the issues and debates concerning the contemporary relationship between religion and science - To explore the ethical implications of scientific progress
Syllabus Objectives	*Knowledge* - identify possible future points of conflict and communication for science and theology. *Understanding* - have an understanding of the connections between the scientific and theological enterprises, particularly in contemporary science and theology - have an awareness of the limits and possibilities of the dialogue between religion and science - have an understanding of the ethical implications of scientific progress - For Higher Level Only - have an understanding of the theological perspectives on current developments in physics or biology. *Skills* - differentiate between the scientific and theological enterprises - engage critically in current debates between religion and science - identify ethical implications of scientific progress *Attitudes* - awareness of the limitations of scientific and religious fundamentalism - openness to the insights of science and religion in current debates - critical evaluation of scientific and technological progress

Topic: 3.1 The Debate about Origins

Procedure

Introduction - why bother about origins?

Discuss: Why bother about origins?
Or Read *Student Work*: ORIGINS
Discuss: What do these stories have in common?
What questions about life are addressed in these stories?
What do these stories show about the worldview of the storyteller?
Why did people tell such stories?
Take feedback and conclude with reference to the following points:

- To understand our present identity and our place in the great scheme of things.
- The need for a foundational story/narrative to relate who we are, where we have come, a vision that binds society together in terms of a larger meaning and purpose.

an overview of current debate on origins

Read *Student Work*: DEBATE ON ORIGINS
& Review / read *Student Work*: THE COSMIC CLOCK (Section J Part 2. 4)

Discuss: What are the main features of the current debate on origins?
Take feedback and note answers on the chalkboard highlighting that how the Anthropic Principle the universe is 'finely tuned' to support the emergence of life raises questions of accident or design in the universe.

According to the astro physicist Robert Jastrow - " At this moment, it seems as though science will never be able to raise the curtain on the mystery of creation. For the scientist who has lived by his faith and the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries." (Robert Jastrow, *God and the Astronomers*, New York: Norton, 1978: 116)
Discuss: Does Jastrow's statement reflect the main features of the current debate on origins? Why? Why not?

ancient and contemporary cosmologies	*- two ancient contrasting cosmologies* *- two contemporary contrasting cosmologies*

Brainstorm: What is Cosmology?
Take feedback and conclude the science of cosmology is the physics of the origin and structure of the universe as a whole. Cosmology asks three basic questions:
1 How did the universe begin? Big Bang Theory
2 How did it get to its present state? Expanding and cooling universe
3 What is its future? Big Crunch or Heat Death

Two Ancient Cosmologies e.g:

1 The Babylonian Epic– Enuma Elish (For text see http:/www.piney.com/Enuma.html) 12 century BCE. The poem starts with the primeval watery chaos and the monsters of chaos. The cosmos unfolds through conflict among the male and female deities in the heavens. The creator god Marduk fought Tiamat, the goddess of the sea, who represents the forces of chaos and malevolence. Having slain her, he divided her body in two and with one half he formed the sky and with the other he formed the earth. He put bones and blood together and made humans to become slaves to perform the menial tasks for the gods. Marduk is elevated to chief of Babylon and to foremost among the pantheon of the gods because of his role in creation, and builds a Temple to himself.
This shows the cosmos unfolding through conflict among the gods. Humans are slaves to the gods. Contrast with the Book of Genesis.

2 Greek Cosmologies: Review *Student Work*: ORIGINS - Matter is eternal, geocentric universe, planets move in perfect circular motion, moved by God as the Unmoved Mover.

Two Modern Cosmologies e.g:

1 Big Bang / Flaring Forth. Review *Student Work*: DEBATE ON ORIGINS -The current scientific theory about cosmic origins, the simultaneous emergence of space and time in a 'hot bang' singularity 15 billion years ago resulting in a rapidly expanding and cooling universe. Contrast this with the Steady State Theory.

2 Creationist Cosmology. Review *Student Work*: STORY OF CREATION GENESIS 1-2:4 a religious anti-evolutionary view of origins based on a literal interpretation of the Book of Genesis: everything was fixed by God from the beginning in a relatively young universe. The Bible is approached as a book of science. Religious stories of creation in the Bible give us a sacred cosmology that portrays basic relationships between God, human life and the

world of nature; it places humankind within a world of meaning, giving our species a sense of purpose.

Discuss: What are the similarities and differences between the ancient and contemporary cosmologies?

- Creation is about agency, the act of an agent, God causing things to be, to exist rather than not to exist (The Why question).
- 'Big Bang' and other theories are about the mechanisms, the process by which the world came to be (The How question). See section A of the syllabus, The Search for Meaning 2.2.

Outcomes: As a result of studying this section, students should be able to

• explain the importance of reflecting on and studying origins
• give a summary of the main features of current debate on origins
• explain the term "cosmology"
• present two contemporary and two ancient cosmologies and identify similarities and differences.

Student Work: ORIGINS

Demeter and Persephone – A Story from Ancient Greece

Demeter was the goddess of the earth. If was she who caused crops to grow; she who made the harvest ripe in the fields; she who made fruit grow sweet and heavy on the branches; she who had first taught men and women how to plant seeds, and care for the young shoots. Demeter had one child, a daughter Persephone, whom she dearly loved, and who was nearly an adult.

Now one day Persephone was out in the fields with her friends gathering flowers, laughing and singing together ns they filled their baskets to overflowing with violets and lilies. The day was light and sunny, and happiness seemed to surround them.

Suddenly their peace was shattered. Charging towards them came two huge powerful horses pulling the chariot of Hades, the god of the underworld. The girls shrank back frightened by the mighty beasts but, as his carriage swept past, Hades saw Persephone and was immediately smitten by her beauty. So instant and violent were his feelings for her that he leaned over and caught her by the waist, pulling her screaming with him. Persephone cried out in terror. " Mother! Mother!"

Hades took no notice of her desperate cries, but urged his horses on faster and faster through rivers and lakes, over mountains and down valleys.

The goddess Cyane heard Persephone's screams and rose out of her watery home to try and stop Hades. "You will go no further", she said. "You must return Persephone to her mother. You should have wooed the girl, not seized her against her will."

Hades was furious that anyone should try to stop him taking Persephone away. He pushed the nymph out of his way and, taking his royal sceptre, struck the bottom of the pool. The ground beneath opened up and the horses and chariot plunged into the fearsome darkness of the underworld, taking the wailing Persephone with them.

Cyane in her grief for the girl, melted into the pool becoming one with the water. On the water's surface floated Persephone's sash. She had flung it out in a last attempt to leave a sign behind her.

Meanwhile Demeter was frantically searching for her daughter. All through the earth she wandered, calling her name, seeking just one person who could tell her where her daughter had gone. At last she came across the sash. Recognising it, she rescued it from the water and held it to her tightly. For the first time her anger and grief came pouring forth. She cursed the world for not protecting her child. The earth she had nurtured for so long now bore her fury. She broke the ploughs, she caused weeds and thistles to choke the crops, she sent plague and famine.

But her anger did not bring her back her lost child, and her quest continued until she came to the river Arethusa. The goddess of the river rose up and spoke to Demeter. "The earth does not deserve your wrath. Your daughter has been taken to the underworld. On my journeys from the mountains to the sea I descend for a time to travel through the underworld before emerging again. There in the underworld I have seen Persephone. She looks pale and sad, but you should comfort yourself for Hades has made her his queen." Demeter was not comforted. She stormed to mount 0lympus and the palace of Zeus, ruler of all the gods, and demanded that her daughter be returned to her.

Zeus looked at the distraught mother. He looked at the tormented earth beneath him and he heard the prayers of the suffering people. He pronounced his judgement. Yes, Persephone could return to the upper world, but on one condition - that she had not eaten anything in the world below. If she had she would belong to that world.

But Persephone had eaten, just once in all her long stay. Absentmindedly she had plucked a pomegranate from one of the trees when she had been walking sorrowfully in Hades' gardens. She had eaten seven pomegranate seeds. Demeter claimed that, because Persephone had eaten so little during her time in the underworld, she should be allowed to return to earth with her. However Hades claimed that because she had eaten even such a small amount she must stay with him in the underworld.

Eventually Zeus decided that for six months of the year Persephone would stay with her mother, but for the other six months she must return to her husband in the underworld. And so it is that when Persephone is with her mother the world is full of light and growth; it is green and fresh. But for the other six months, when she must live with Hades, the world is cold and barren, for Demeter is mourning the loss of her daughter.

The First Word – A Story from India

In the beginning there was only darkness and emptiness, but the darkness and emptiness were not cold or lifeless. There was a warmth and a dampness and a soft breathing. Gradually the breathing became a whisper and the whisper grew and grew until it filled all the space. The first word was created, "Om".

The first word had power. It created a deep ocean, and in the depths of the ocean lay a seed. Long, long years passed and the seed floated to the surface and became a huge golden egg. Gently the waves rocked it, and the light from within reached out to light up the world.

The years passed and everywhere was heard the sacred word "Om". It nourished the life within the shell and created Brahma himself, the Creator of worlds. One day the egg broke open with a loud crack. Brahma was born. From one half of the shell he created the sky; from the other he created the earth, and to keep them apart he created air.

Then Brahma created from himself many senses such as thought, hearing, sight, touch, taste, smell. He blended them together in different mixtures, creating living beings of every kind. To each kind he gave gifts. To the plants he gave two gifts: touch and the power to remake themselves with seeds and fruits. To the birds, animals and fish, he gave seven gifts: touch, taste, hearing, sight, smell and the power to remake themselves and the power of movement.

The earth teemed with the joy of new life, but one gift Brahma had not given to his creatures- the gift of thought. Many ages passed, Brahma roamed the worlds, sometimes riding a swan or a peacock, sometimes sailing the seas and the rivers in a lotus boat.

Then Brahma created from within himself another being, Sarasvati. She was beautiful. Brahma loved her and married her and they gave birth to Mani, the first human being. To him Brahma gave all of his gifts: the five senses, the power of movement, the power to remake himself and the greatest gift of all - the gift of thought.

(Resource suggested by LCRE teachers Maria Immaculata Community College, Dunmanway Co. Cork)

Discuss: What do these stories have in common?
What questions about life are addressed in these stories?
What do these stories show about the worldview of the storyteller?

Student Work: DEBATE ON ORIGINS

Astronomers from Ptolemy, Copernicus, and Galileo and through the eighteenth century assumed that the universe is very small in size and young in age. In the nineteenth century claims from the biblical literalists that the universe was only a few thousand years old conflicted with the evidence from geology, evolutionary theory and fossil records. The Great Telescope at Birr Castle, County Offaly, was built by the Earl of Ross in the 1840s, and was the largest telescope the in world for seventy years. The telescope provided evidence that distant objects outside the Milky Way were in fact other galaxies, some of which were very large and spiral in shape. The discovery that the universe is expanding is one of the great scientific revolutions of the twentieth century. In 1924 the American astronomer Edwin Hubble showed that ours was not the only galaxy. In 1929 Hubble observed distant galaxies moving rapidly away from us and concluded that the universe in expanding. These observations undermine the older view that saw the universe as static and fixed, unchanging and stable. Modern cosmology has laid to rest the idea of an eternally existing universe; the universe has not existed forever but did have a definite beginning in the very distant past. Cosmology tells us that the universe began with a cosmic explosion called the Big Bang or Flaring Forth, that everything was concentrated in a dense point and out of this explosion came everything: space, time, matter and energy. Since then the universe has been expanding rapidly and cooling.

In 1963 two Bell Laboratory physicists Arno Penzias and Robert Wilson accidentally picked up the very low sound of the Big Bang. Their large microwave antenna had detected the still resonating echo of the birth of our universe. The big bang was like a bubble ballooning out or the first fortissimo bars of a great symphony, which occur simultaneously everywhere, filling all space at one. Nanoseconds later, as particles formed, every particle was rushing apart from every other – to form eventually our current curved and expanding galactic space.

The universe is estimated to consist of ten billion galaxies, each composed of billions of stars and gas clouds where stars are formed. Yet, all this matter is but an exception to the rule of emptiness, grains of sand spread thinly through a void. Our own galaxy, the Milky Way, is spiral in shape and rotates; it is thought to contain one hundred billion stars, and to be about one hundred thousand light years in diameter. Our Sun is a smallish star, situated about thirty-two thousand light years from the centre of the galaxy near the edge of one of the spiral arms. We are in a much larger and longer-lived universe than we could ever imagine. The observation that the universe is expanding leads to the proposition that, going backwards in time, there was a moment in the distant past (about fifteen billion years ago) when the whole universe was concentrated into a single point. So a very long time ago the whole of the universe was squeezed into an unimaginably small and dense grain of matter, no larger than the nucleus of an atom. The universe must have arisen from a 'singularity', a unique event that cannot be fully described by the laws of physics.

A striking discovery of modern cosmology is that there are certain basic features of the universe, which have enabled living organisms, and ultimately human life, to develop. The physical conditions that enabled life to exist are very sensitive to a small number of fundamental constants. If the values of these constants had been only slightly different we would not be here, life would not have evolved. Physicists like John D. Barrow and Frarlk J. Tipler conclude that from the very outset, our fiery, original universe was somehow exactly primed for the emergence of life. This is called the “anthropic principle”. “Anthropos” is the Greek word for “human”. The term is used to refer to the remarkable “fine-tuning” of the early universe in giving rise to human life. The overall chemical composition of the universe was determined by the first few seconds of the Big Bang. The elements on which life depends (such as carbon, oxygen, nitrogen and iron) are the product of nuclear reactions within stars. In both cases the processes by which the elements are formed are governed quite precisely by the strength of four basic physical forces:

- Gravitation - long distance attraction between masses
- Weak Nuclear - responsible for radioactive decay
- Strong Nuclear - binds quarks together in protons and neutrons
- Electromagnetic - responsible for light and the behaviour of charged particles

If the relative strengths of these forces were only a little different, the universe would be very different or non-existent. As Stephen Hawking explains: "If the rate of expansion one second after the big bang had been smaller by even one part in a hundred thousand million, the universe would have recollapsed before it ever reached its present size.”

(Adapted from At Home in the Cosmos: The Poetics of Matter= Energy by David S. Toolan in America February 24,1996 Published by the Jesuits of the United States and Canada. & A Brief History of Time: From the Big Bang to Black Holes, Bantam Press 1988: 121-122 *&Religion and Science – F. McCarthy & J. McCann)*