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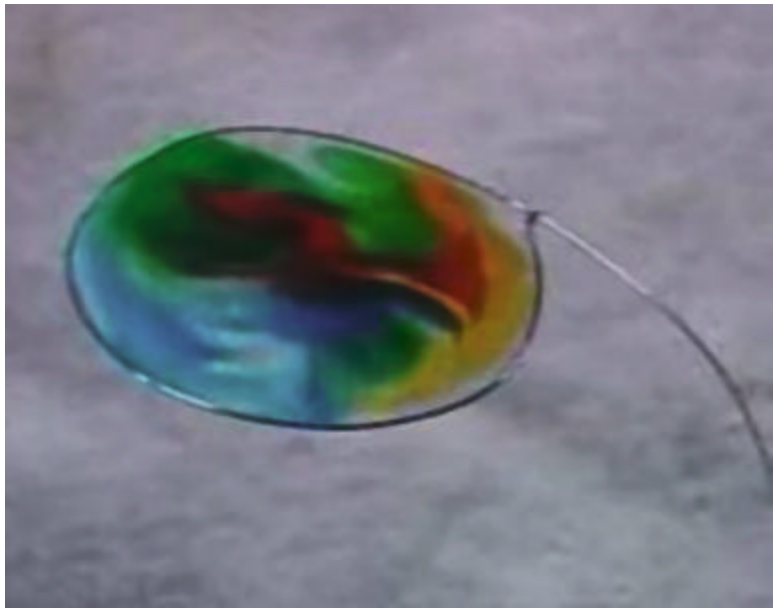
THE

BIBLICAL ASTRONOMER

SPRING 2003



Mysterious, Tough New Film

(Publications list continued from the back cover.)

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Cover: This film was a complete surprise when it was tried in the International Space Station. It turns out to be tough, flexible, and very, very long lasting. Find out more in the "Editorial" in this issue.

THE BIBLICAL ASTRONOMER

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EDITORIAL

In this issue we lead off with the next installment of our guide to the early constellations. This time we look at the constellation commonly called Cetus, the whale or the sea monster. It is one of a group of five constellations, all related by a single story. (Pegasus, the sixth member of the group does not figure directly in this particular tale.)

Most of the reports included in "Panorama" have greater significance for a young creation than average. Lunar catastrophism, the origin of Frank's ice comets, the rapid formation of the giant planets, and the little big bangs that confound *the* big bang all relate to some degree to a young universe, if not a universe that escapes our understanding.

On the geocentric front, we look at the evidence that time is not quantized and we analyze the recent report that the speed of gravity is the same as the speed of light. The two topics have to do with the firmament and the stability of the universe.

Finally in "Panorama," there is more to report on the increased mass of the earth's equator. It seems to be due to a combination of melting glaciers and sea-level shifts induced by El Niño. The global warming beast raises its ugly head, but are we really undergoing global warming or has the earth actually been cooling over the last 3,000 years? See for yourself.

Also in this issue we present another essay by Bartholomew Dobson. Readers may remember his first one, which documented how belief in extraterrestrial life influenced the early stages of modern science. This time Bartholomew looks at the wellspring of modern science.

About the cover

Finally, we thought readers might be interested in an explanation of the film on the cover of this issue. One might think it is a new soap film, or some form of plastic, but that is most certainly not the case.

Don Pettit is an American astronaut who had been stationed aboard the International Space Station since November 2002. His hobby while there is to conduct a new experiment each Saturday. It is his way of spending the short amount of free time only available on that day of the week. One Saturday in February, Don was going to investigate the behavior of soap bubbles under weightlessness. The soap solution was mixed and ready to go, but just for fun, Don decided to see how water by itself would work.

To everyone's surprise, the water clung to the ring just as a soap film. It could be touched, swayed back and forth, and stirred without breaking. It seemed to be tough as rubber.

The picture that graces our cover is one of those water films. However, this one has been painted on by using alcohol-based food colors. In an hour or so the colors slowly mixed to a brown.

The cause of this film lies in the electrical attraction between water molecules, which causes the "surface tension" of water. That property is the same in earth as it is in space. What does differ is the competition between surface tension and gravity. On earth, if a thin film of water is held parallel to the ground, the pull of gravity causes the film to sag in the middle. Water drains downward from the edge of the loop and a little pool forms. This makes the film sag more, causing more water to flow down to the pool. Thus, the pool gets bigger and bigger until its weight rips the film apart. In orbit, however, the film is in free fall, weightless, so the film doesn't sag. The central pool never forms, so the surface tension wins the competition with gravity, and the result is a sturdy long-lasting membrane.

The longest water films lasted 12 hours. They broke because the water eventually evaporated until the film was too thin to stay together. Each film was between two to four inches (5 to 11 cm) in diameter (the wire ring was adjustable).

The discovery has some significance to the waters mentioned in Scripture. Besides the obvious reference to Job 26:10, which says, God "has compassed the water with bounds," (also see Proverbs 30:4), this property may play a role in the lower boundary of the waters above the firmament. That water is said to be frozen (Job 38:30, the context is hidden water which is not likely to refer to the surface of the seas and oceans which are not hidden). Just how and if this newly discovered toughness relates to the frozen state remains to be seen, but it certainly will have implications for water molecules clustered together in droplets near stars and planets, and in interstellar space.

What is well documented on earth is that water's properties are quite flexible, that there are eight forms of ice, most of which exist at high temperatures and pressures. These forms have significance inside the earth. Now we have the first hint of water's properties in weightless environments.

CETUS THE SEA MONSTER

Gerardus D. Bouw, Ph.D.

Introduction

This is the fourth installment in our examination of the witness of the stars, also called "The gospel in the stars," in which we review astronomical traditions and writings dating back almost to the Flood around 2300 B.C., if not earlier. These traditions associate the constellations with a message that a redeemer will come to deliver his bride from the clutches of a wicked one. The wicked one usually appears in the form of a serpent or some monstrous beast. The hero rescues the bride at the cost of his life, which may include being swallowed by the monster for three days and nights. Yet the hero is regurgitated or resurrected and becomes king, marries the fair damsel, and wins himself a kingdom which he rules with his bride reigning beside him as queen. Additional themes include the wounding of the hero's heel and the bruising of the heel's head. (Sorry, I could not resist the pun. After all, that is whence the term arose in the first place. For those who may not know, "heel," in addition to the back part of the foot, is an informal English word referring to a dishonorable man, a cad.)

The foundation for the theory of the witness of the stars is that God, when he created the stars for signs and for seasons, formed the constellations and placed into their arrangement an account of his plan for the redemption of man, which is the gospel of the Lord Jesus Christ. That gospel is that no man is righteous and that all have sinned and deserve eternal damnation in hell. But God, willing to make his mercy known, reconciled man to himself in the person of his only begotten Son, the Lord Jesus Christ; who was fully God and fully man, and who without sin shed his blood on the cross as a sacrifice for all sin. Thus he cleansed us of all our sins past, present and future; and all who believe that simple fact, not seeking to establish their own (self-) righteousness but accepting the imputed righteousness of God, are counted righteous in the sight of God and will live eternally with him in indescribable joy.

The theory continues that God instilled in Adam that knowledge, and thence to Seth who is held by many of the ancients to be the first astronomer. Others regard Adam as the first. Over the millennia, the interpretation of the constellations has become secularized among the Gentiles, and

corrupted by Cabbalistic teachings among the Jews. Our current constellation, Cetus, affords us an example of such corruption.

We further assume that the original language, given to Adam and Eve, was Hebrew. All Semitic languages seem to stem from it. And most languages contain a remnant foundation of Semitic words. That is, we believe that Aramaic was derived from Hebrew, and not the reverse. As it is written in Genesis 11:9, "Therefore is the name of it called Babel; because the LORD did there *confound* the language of all the earth: and from thence did the LORD scatter them abroad upon the face of all the earth." *Confound* has synonyms entangle, snarl, knot, and twist; in this case an entangled foundation for all the major language families. Without such a common "foundation," languages cannot be translated one to another, *viz.*, the languages of dolphins, whales, cats, dogs, birds, insects which primarily communicate by scents (pheromones), and even trees and plants. *Confuse* is the wrong translation, since confusion implies "To cause to be unable to think with clarity or act with intelligence or understanding."[1] In other words, confused languages cannot be translated. And so, it is our contention that using Hebrew word roots, we recover the witness of the stars in its original, Scriptural form.

Our last assumption is that if God made the constellations for the gospel reason, then a figure should reflect what its name suggests. That assumption is flatly denied today. Indeed, textbooks on the constellations flatly state that the signs do *not* reflect what their names signify. The main reason why such a statement can pass as fact today is because of the widespread belief in the myth of evolution. Since evolution says we're evolving for the better, and that each generation is physically superior to the former, it follows that if we are not visually acute enough to see the forms, certainly the vision of our grunt-and-groan troglodyte ancestors could not possibly be superior ours today. Our position is that since Adam was closer to the moment of creation, his vision was superior to anyone living today. We assume simplification (the antonym of evolution) over time. That is, we assume that the second law of thermodynamics is in effect. On that basis, we conservatively assume that our ancestors could perceive stars down to magnitude 6, whereas the limiting magnitude for the modern eye is around 5.[2]

To augment the assumption that Hebrew is the antediluvian language in our analyses of the individual constellations, we use two primary refer-

[1] American Heritage Dictionary.

[2] When astronomers speak of magnitude, the larger the number, the fainter the star. The faintest stars that have been observed using instruments is 32. The sun is magnitude –26. A magnitude 5 star is 2.5 times more luminous than one of magnitude 6.

ences and three secondary ones. The oldest primary reference is Frances Rolleston's monumental tome, *Mazzaroth or, the Constellations*.[3] The second is Richard Hinckley Allen's *Star Names: Their Lore and Meaning*.[4] The secondary references are English translations of *The Constellations* of Pseudo-Eratosthenes and the *Poetic Astronomy* of Hyginus,[5] the *Euphratean Star List*, and the *Star List of Ptolemy*.

Cetus today

Most of what we know about Cetus comes from two fifth-century B.C. playwrights, Euripides and Sophocles, each of whom, wrote a dramatic play about a woman named *Andromeda*. Her story was old even at the time. The nineteenth century English orientalist, Archibald H. Sayce of Oxford, claimed that Andromeda, under another name, appeared in the ancient Babylonian *Epic of Creation*, written about 2000 B.C., not too long after the Flood. In the story of Marduk[6] and the dragon, Tiamet, we find the oldest reference to the story of Perseus and Andromeda. Tiamet[7] was the monster of primeval chaos, and was associated with the constellations Draco,[8] Hydra,[9] Cetus, and Serpens. The latter is part of the constellation Ophiuchus.

The playwrights' story starts when Andromeda's mother, Queen Cassiopeia, vainly claimed that her beauty rivaled that of the Nereids. This so infuriated their father, Neptune (the same is Poseidon), that he sent a sea monster to plague Cassiopeia's husband, king Cephus. Another version claims that the monster was sent to devour their daughter, Andromeda, who was chained to a rock for her mother's impertinence. On his way back home after slaying the Gorgon Medusa, Perseus[10] arrived on the scene and uses the Gorgon head, which turns to stone anyone who looks at it, to kill the monster. In gratitude, Andromeda leaves her parents, marries

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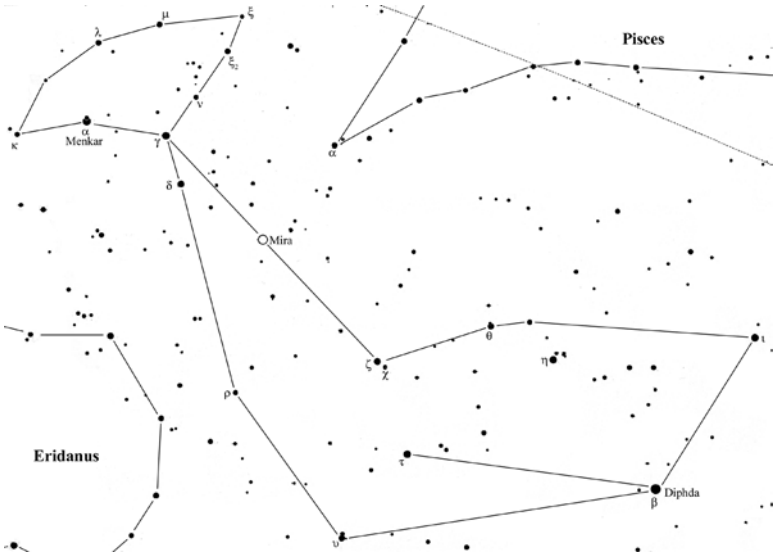
[3] Rolleston, F., 1862. *Mazzaroth or, the Constellations*. (London: Rivington's, Waterloo Place).
[4] Allen, R. H., *op cit.*
[5] Condos, T., trans., 1997. *Star Myths of the Greeks and Romans: a Sourcebook*, (Grand Rapids: Phanes Press).
[6] Marduk later acquires the name Bel (lord), who was also called "Baal."
[7] Tiamet, described as the embodiment of evil, both physical and moral, was said to be some 300 miles long, and moved in undulations 6 miles high.
[8] Bouw, G. D., 2002. "Draco the Dragon," *B.A.* **12**(99):51.
[9] Bouw, G. D., 2002. "Hydra the Serpent," *B.A.* **12**(100):92.
[10] Persues may actually be Greek for Persian. The Greeks were not known for their knowledge of other peoples. For instance, the Greeks did not know the name of the sixth century B.C. Ethiopian moralist Lochman, so they referred to him by his nationality, Æthiops, that is, Æsop. By the way, *Lochman* means gentle man.



Perseus, and freely goes to Argos with him. Another version has the couple staying with king Cephus for several years, and, when they depart for Argos, they leave their firstborn son, Persis, with Cephus to inherit the kingdom after him, seeing he had no son.

Thus far, the tale has little in common with the gospel. But there is more behind it than meets the eye. Earlier tales about Perseus identify him with Hercules, who freed Hesione (the same is the Greek Andromeda). This places him to the time of Jason and the Argonauts, that is, back to the Argosy, and also ties him to Perseus's home town of Argos. Lycophron,[11] in his *The Twelve Labours of Hercules*, says that Hercules spent three days and three nights in a sea monster's belly. Æneas Gazeus said, "Hercules is reported to have been, when shipwrecked, swallowed up by a whale." That tale, in turn, came from the Euphrates, not from Greece.[12] Thus, the earliest known account was told in a Semitic language, in this case Aramaic.

In the Aramaic account, we see echoes of the story of Jonah, who went to preach repentance unto Nineveh, the Assyrian capital city on the banks of the Tigris River, (whose ruins lie across the river from modern

[11] Lycophron lived at the court of Ptolemy Philadelphus.
[12] Allen, R. H., 1899. *Star Names and Their Meanings*. Reprinted 1963 as *Star Names: Their Lore and Meaning*, (New York: Dover Publications), p. 160.

Mosul, Iraq). Nineveh fell to the Babylonians roughly a century after its revival due to the preaching of Jonah. So the story was old when the Greeks received it from the Babylonians.

Why did the Greeks not acknowledge the Babylonian origin? Except for philosophers, the Greeks believed that only Greece was civilized and all other nations were barbarians. The philosophers made pilgrimages to Babylon and, especially, Egypt. Upon their return, the knowledge they acquired made them appear great in the eyes of their countrymen. So, it just wasn't in their best interest to tell the truth about such things. Indeed, they may have deliberately changed foreign names to Greek.

In the Egyptian star chart called the *Dendera*, the constellation is called *Khem*. The word means "subdued," reflecting its conquest by Perseus or Marduk.

The star names of Cetus

Since this is an ancient "Euphratean" constellation, do the names of its stars reflect its Semitic origin? Of the current star names, most are Arabic and less than two millennia old. Indeed, they describe the features of the constellation. For instance, β, which despite its secondary designation is the brightest star, is called *Deneb Kaitos*, meaning tail of the whale (Kaitos) in Arabic. In our figure of the constellation, it is at the front of the whale's mouth. The star that is the eye, η, is also called *Deneb*, meaning tail. The star ζ is called *Baten Kaitos*, meaning belly of the whale. Clearly, this star is higher up the body. The circlet of stars ε, π, ρ, and σ are the Arab astronomer, Al Sufi's, *Al Sadr al Kaitos*; the whale's breast.

The second brightest star, α, is called *Menkar*, which is *Al Minhar* in Arabic. The Arabic name means nose. But herein lies the key, for *Menkar*, it turns out, has a Hebrew meaning, namely, apportioned enemy, or, according to Rolleston, bound or chained enemy. Since the Arabic names are recent, it seems likely that the ancient Hebrew name Menkar was taken by them to be minhar, meaning, "nose," and so is possibly responsible for turning the orientation of the beast around into its modern state. The only star definitely not labeling a body part is another name for β, *Diphda*, (also spelled *Difda*,) which in Arabic means "frog." In Hebrew, *diphda* means thrust down," implying the star is part of the head.

The most unusual star visible to the naked eye is also found in this constellation. It is called Mira. Mira is an example of a long-period variable star. Over the course of about eleven months it varies in brightness from magnitude 1.7, brighter than the brightest stars in the Big Dipper, to magnitude 9.5, requiring a moderately-sized telescope to see, and back to

1.7 again. Mira means "wonderful," (think mira-cle), but Rolleston found a Hebrew form meaning "rebel." The only other prominent naked-eye variable is a star in Perseus called "Algol," literally, the ghoul. If this is indicative of how variable stars were viewed by the ancients, then Rolleston's translation of Mira as "rebel" appears more likely than the Arabic "wonderful."

Even so, the star names tell us little to nothing about the constellation of Cetus that we could not infer from its name and the following scriptural references.

The whale in Scripture

Four times in Scripture whales are mentioned, and one time a sea monster. The four references to whales are these:

1. Gen 1:21—And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that *it was* good.

The Hebrew is *tannin,* expressing a lengthy monstrosity, that it, a huge, frightful creature. The modern versions erroneously translate the word as "jackal." Apparently, they do so on the strength that some Arab names applied to stars in the constellation Draco (the dragon), refer to hyenas and camels. This, however, has nothing to do with the constellation itself. Spiritually and literally speaking, the jackal reading comes from the dragon.[13]

2. Job 7:12—*Am* I a sea, or a whale, that thou settest a watch over me?

3. Ezek 32:2—Son of man, take up a lamentation for Pharaoh king of Egypt, and say unto him, Thou art like a young lion of the nations, and thou *art* as a whale in the seas: and thou camest forth with thy rivers, and troubledst the waters with thy feet, and fouledst their rivers.

This identifies the whale as a type for Pharaoh. The predatory characterization implies something like a killer whale (orca) is meant, but more lies ahead which suggests a larger, more terrible form.

[13] Bouw, G. D., 2002. "Draco the Dragon," *B.A.* **12**(99):51.

The last mention of whale identifies the fish that swallowed Jonah as a whale:

4. Mat 12:40—For as Jonas was three days and three nights in the whale's belly; so shall the Son of man be three days and three nights in the heart of the earth.

Some may argue that this is a great fish, as proclaimed in Jonah, but the Greek is the root for "cetaceous," meaning, "pertaining to whales."

Finally, we have the sea monster:

5. Lam 4:3—Even the sea monsters draw out the breast, they give suck to their young ones: the daughter of my people *is become* cruel, like the ostriches in the wilderness.

Here we note firstly that the Scripture knew that whales are mammals, likely long before scholars knew that. Secondly, since dragons are reptiles this cannot refer to a sea serpent or dragon.

We also have certain parallels between the above scriptures and the various accounts of the constellations. First, Israel was in Pharaoh's "belly" before the Exodus, starting with the attempt by Pharaoh to devour their sons (Ex. 1:10 v.f.) and ending with the sea devouring Pharaoh (Ex. 14:27). So, too, was Jonah in the belly of the whale three days and three nights, which was a type of the death, burial and resurrection of Christ. The first parallel was to call Israel to repentance, the second to call Nineveh (a type of the Gentiles) to repentance, in type, a call to the world to repentance, even to call out of it a bride for himself.

A second parallel stems from the comparison of Pharaoh with other animals, particularly, a whale in Eze. 32:2. The whale, as Pharaoh, inherits the properties of the dragon and the serpent, that is, Satan. Tiamet was said to be immense, and the rest of the verses in Ezekiel 32 communicate the same when it prophesies that Pharaoh's body will feed the beasts of the whole earth (v. 4), that it shall cover the mountains and fill the valleys with its height (v. 5). The same things are said about Pharaoh in several other places in Scripture. I leave it to the reader to judge whether the Scripture got these ideas from the legend of Tiamet, expressed a thousand years before Ezekiel; or Tiamet's nature and size, stemmed from an earlier revelation, probably oral, but perhaps written.[14]

[14] There is a theory, called the "Toledoth theory," which maintains that each time in Genesis we read "These are the generations of …" (Gen. 2:4; 5:1; 6:9…), a change of scribe is indicated. The theory has been around for a long time.

Tiamet reminds one of leviathan,[15] which is another type of Satan. Leviathan is not a whale for it has scales. Neither does the description of Tiamet suggest a whale. However, the description of Tiamet fits that of Leviathan as far as it goes, except that leviathan has seven heads (Psa. 74:14; Rev. 13:1), whereas Tiamet apparently had one.

We conclude from these things that in Scripture, the whale is a type of death itself. (Perhaps the tradition of the seven deadly sins comes from the seven heads.) And just as the princess Andromeda was rescued from unavoidable death, even so, the Lord Jesus Christ will rescue his bride from unavoidable death, for in Adam each soul is bound to die. It is significant that in Scripture, the soul is typed by a woman, such as the story of Ruth, for instance, and the woman called Love in the Song of Solomon. Death itself will be abolished (Rev. 20:13-14[16]) and suffer the same fate as the devil, the beast, and the false prophet (Rev. 20:10[17]).

(To be continued)

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QUOTE

Darwin did not invent all of his zoo-mania. Erasmus Darwin (1731-1802) wrote a pulp article called "Zoonomia," which greatly inspired William Paley (1732-1805). Both of these men were instrumental in erecting the superstructure of Darwin's monstrosity. Jean Baptiste de Lamarck (1774-1805), Robert Chambers (1802-1871), and Rousseau (1712-1778), all contributed; and Darwin's and Spencer's final statement on the theory included slavish fidelity to the "Nebular Hypothesis" of Kant and Laplace. It is interesting to note that Charles Darwin (1809-1882) love Lyell's *Principles of Geology* (1797-1875).

–Peter S. Ruckman, *The Sure Word of Prophecy*
(Pensacola, FL: Bible Believers Press), pp. 33-34.

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[15] Job 41:1-34.

[16] Rev 20:13-14 – And the sea gave up the dead which were in it; and death and hell delivered up the dead which were in them: and they were judged every man according to their works. And death and hell were cast into the lake of fire. This is the second death.

[17] Rev 20:10 – And the devil that deceived them was cast into the lake of fire and brimstone, where the beast and the false prophet *are,* and shall be tormented day and night for ever and ever.

PANORAMA

NASA Solves Half-Century Old Moon Mystery

Over the past 170-plus years, the principle of uniformitarianism, that all phenomena can be explained in terms of events happening today (2 Peter 3:4-5 to the contrary), has served more to stymie new ideas in science than any Christian "fundamentalism" ever could. Here's but one more example from a recent issue of *Icarus*, which was reported as NASA Press Release 2003-023.[1]

In the early morning hours (2:00 U.T.) of Nov. 15, 1953, Dr. Leon Stuart, an amateur astronomer in Oklahoma, photographed what he believed to be a massive, white-hot fireball of vaporized rock rising from the center of the Moon's face.[2] Despite reports of many similar, albeit not photographed, phenomena,[3] "Stuart's Event," as astronomers called it, was dismissed as the flash of an approaching meteorite in earth's atmosphere.

Recently, Dr. Bonnie J. Buratti, of NASA's Jet Propulsion Laboratory, and Lane Johnson of Pomona College, Claremont, Calif., took a fresh look at the 50-year-old lunar mystery. "Stuart's remarkable photograph of the collision gave us an excellent starting point in our search," said Buratti. "We were able to estimate the energy produced by the collision, but we calculated that any crater resulting from the collision would have been too small to be seen by even the best earth-based telescopes, so we looked elsewhere for proof." Burratti and Lane isolated a 22-mile (35 km) square region where the impact likely occurred. First they searched photographs taken from the Lunar Orbiter spacecraft back in 1967, but none of the craters appeared a likely candidate. Then they consulted the more detailed imagery taken from the Clementine spacecraft in 1994.

"Using Stuart's photograph of the lunar flash, we estimated the object that hit the Moon was approximately 20 meters (65 feet) across, and the resulting crater would be in the range of one to two kilometers (.62 to

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[1] Agle, D. C., and Don Savage, 2003. NASA Solves Half-century Old Moon Mystery," NASA News Release 2003-023, February 20.

[2] Stuart, L., 1957. *J. Int. Lunar Soc.*, **1**. Also *Strolling Astronomer*, 1956.

[3] Middlehurst, B., J. M. Burley, P. Moore, & B. L. Weither, 1968. *Chronological Catalog of Reported Lunar Events*, NASA Technical Report TR R-277, July. Stuart's Event is number 312 of 579 transient lunar events reported through Oct. 19, 1967. A Xeroxed copy of the publication may be obtained from The Sourcebook Project, P.O. Box 107, Glen Arm, MD 21057.

1.24 miles) across. We were looking for fresh craters with a non-eroded appearance," Buratti said. Part of what makes a Moon crater look "fresh" is the appearance of a bluish tinge to the surface. This bluish tinge indicates lunar soil that is relatively untouched by space weathering, which reddens the soil. Another indicator of a fresh crater is that it reflects distinctly more light than the surrounding area. So doing, Buratti and Lane found a 0.93-mile (1.5-km) wide crater. It was located in the middle of Stuart's 1953-photographed flash. The crater's size is consistent with the energy produced by the observed flash; it has the right color and reflectance, and it is the right shape. They estimate that the impact's energy was equivalent to half a megaton of TNT, about 35 times the energy of the bomb that leveled Hiroshima to end World War II.

Dr. Stuart died in 1969. His son Jerry Stuart, hearing of Buratti and Lane's findings, said: "Astronomy is all about investigation and discovery. It was my father's passion, and I know he would be quite pleased."

Frank's comets

A few years ago, readers may remember, Dr. Louis Frank reported satellite detection of dark spots against the sunlit earth. Originally thought to be comets,[4] the literature later reported that they were instrumental artifacts, flaws in the observing equipment. Evidence against that conclusion was summarized in issue number 91.[5] Perhaps the main objection or, should I say, *problem*, is that the comets appear to be seasonal.

In a radio interview entitled "The Cosmic Rain from Space," Frank speculated with what seemed to be 95% certainty that the reason the small comets were seasonal (i.e., there's a much higher incidence of comets during the fall), is because there is a "dark star" way beyond our solar system that is exerting its influence on these comets to cause the seasonal change. The same dark star, which no one has ever seen and no one is certain really exists, is also blamed for ejecting an occasional comet from the alleged Oort cloud into the solar system. When observed by astronomers, such a comet is called a "long-period comet." Long-period comets have periods of hundreds to thousands of years. The theory was developed to explain why we still see an abundance of long-period comets when by all rights, in billions of years, all should have been either ejected or have no tails left. The Kuiper Belt is now believed to be the source of short-period comets, such as Haley's comet, though before that conclusion, astronomers were just as certain that the short-period comets were long-period comets perturbed into a shorter period by one of the large

[4] Panorama, 1997. "Rain of snowballs," *Biblical Astronomer*, **7**(81):14.
[5] Panorama, 2000. "Frank's water comets: not dead yet," *B. A.*, **10**:(91), 21.

planets. To be technically correct, *KuiperBelt* is not an official name for what is referred to by the technically correct term *Trans-Neptunian Objects* (TNOs). These were observed before they were actually identified as the potential source of short-period comets. One wonders how many graduate students were denied a Ph.D. or a job in astronomy because they questioned the superstition that an extremely rare event could populate a more abundant short-lived population. Never overestimate the intelligence of an atheist; God doesn't call them "fools" for nothing (Psalm 14:1).

Dr. Frank still believes in the comet infall theory he proposed in 1997. That's actually quite heartening since the snowball-comets testify of scriptural creation. There are two creationist scenarios.

It is possible that water about the earth (Gen. 1:2) figured in the entire creation of the solar system, in all the planets. Then the snowballs would have been left over from the creation event. Ejected and gravitationally perturbed by the planets, some would fall to earth and others spread over the solar system.

The second scenario is that the waters around the original earth, when the expansion of the firmament (either on the second day, or the fourth, or both) carried them to the border of the cosmos, left an Oort-cloud-like shell of snowball material centered on the earth. The snowballs would have formed during the expansion event. These would eventually fall back to the solar system. A trail may have streamed behind the expansion, and, now falling into orbit about the sun, are the source of Frank's snowballs. If solid material was left behind with the snowballs, this could also explain the cratered surfaces of the planets and moons.

Frank's solution is simple. The snowballs are distributed inside a gigantic ellipsoid (an elliptical 3-dimensional solid), extending way, way, beyond the solar system with a period of hundreds of years. The ellipsoid sweeps past the earth in the fall.

Time tattles on the firmament, Big Bang

It's been 16 years now since the *Biblical* Astronomer, then called the *Bulletin of the Tychonian Society*, identified the elusive Planck medium as the firmament.[6] Conventional wisdom insists that the firmament is nothing more than an ancient Hebrew myth, probably stolen from the Egyptians, but conventional though conventional wisdom may be, it is rarely wise. But on 17 March 2003, a Huntsville, Alabama news release shed

[6] Bouw, G. D., 1987. "The Firmament," *Bulletin of the Tychonian Society*, no. 43, p. 11, April.

new light on the "mythical" firmament and makes the conventional wisdom more mythical than the firmament.

The conventional (modern) scientifically-acceptable view of the firmament is that it is a vacuum state made up of virtual (imaginary) particles that pop into existence, exist for a brief instant of time ($4x10^{-44}$ second), and then pop out of existence. That duration of time is called a *Planck interval*. The entire universe is viewed as a roiling foam of such virtual particles.

Once upon a time, about 15 billion years ago, scientifically correct conventional wisdom alleges, roughly 10^{60} of these virtual particles decided to "get real," as the kids say, and exploded, starting the "event one" of science fantasy: the Big Bang. And the reason why this happened was that each of those 10^{60} Planck particles lost track of time; they forgot that at the stroke of $4x10^{-44}$ seconds o'clock they were supposed to cease existing. Once they started to expand as a unit, it was too late to go back to their home (the firmament) because they were now too rare[7] to be absorbed back into the firmament. Thus the Big Bang was born, having been conceived by George Gamow in the early 1930s, and christened by Fred Hoyle in the early 1950s.

The key to this birth is that time must be quantized. If time flows smoothly, then the particles could not lose track of time and they would have returned to their "virtuous" state.

So with that introduction we set the stage to understand the contents of the 17 March 2003 press report mentioned earlier. The article itself is published in the online issue of the *Astrophysical Journal*. Here is a synopsis of the press report:

Images of galaxies four billion light years away threaten to rip apart modern theories about space and time. The rays of light that have traveled half way across the universe may force astrophysicists to completely rethink their ideas about the Big Bang which gave birth to the cosmos. They suggest that time does not flow in incredibly small but finite and measurable bits, or "quanta," as most scientists believe. Instead of time being made up of many individual moments, like grains of sand running through an hourglass, it appears to move in a seamless, continuous flow.

If this proves to be the case, it will cause consternation in the world of astrophysics. One of the biggest problems concerns the Big Bang. It implies that in the first instant of creation the singularity or "point" that became the universe had infinite temperature and density–something cosmologists have strenuously tried to avoid. According to current theories,

[7] "Rare" here refers to density, the expansion caused the density of the particle foam to drop below their normal 10^{-94} gm/cm^3.

[one second of] time should be divisible into 20 million trillion, trillion, trillion Planck intervals. The shortest possible spatial measurement, the *Planck length*, is the distance light can travel in one Planck interval–about 0.00000000000000000000000000000001cm (10^{-33}).

Scientists say time and distances smaller than Planck scales are "fuzzy" because in a fundamental way they cannot be measured. The theory allows for Planck-scale fluctuations in time and space, which translate to minute variations in the speed of light. However, these variations would only be evident in light that has traveled a great distance. In a similar way, a sprinter running one percent faster than his opponents might win a 10-meter race in a photo finish, while a one percent faster marathon runner will finish hundreds of yards (meters) ahead of the rests of the field. After billions of light years, the faster components of a light wave would be far enough ahead of the slower components to make the beam's wave front noticeably distorted, or blurred.

Two astrophysicists from the University of Alabama in Huntsville, tested the theory of quantum time by looking for this blurring in Hubble Space Telescope images of galaxies at least four billion light years away. Dr. Richard Lieu and Dr. Lloyd Hillman were taken by surprise when they did not find it. Instead, each image showed a sharp, ring-like interference pattern around the galaxy. Not finding the expected blurring suggested that time was not a quantum function and flowed fluidly at intervals infinitely shorter than Planck units of time.

Dr. Lieu said: "If time doesn't become 'fuzzy' beneath a Planck interval, this discovery will present problems to several astrophysical and cosmological models, including the Big Bang model of the universe." The Big Bang theory supposes that at the instant of creation, the quantum singularity that became the universe would need to have infinite density and temperature. To avoid that sticky problem, theorists invoked the Planck time. They think that if the instant of creation was also a quantum event, when space and time were both blurry, then you don't need infinite density and temperature at the start of the Big Bang.

"If time moves along like business as usual even at Planck scales, however, you have to reconcile the Big Bang model with an event that isn't just off the scale, it's infinite," Lieu said.

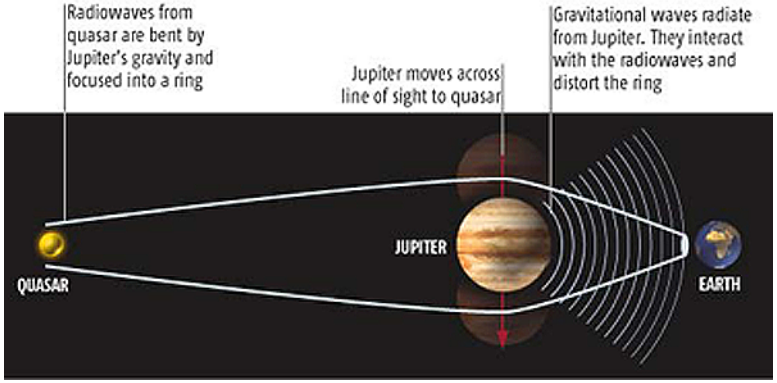
It turns out that the firmament theory works best if time flows continuously in the way indicated by Lieu's results. The results are controversial; nevertheless, if the speed of gravity is higher than the speed of light (see the following story), then it makes sense that time is not quantized.

Is the speed of gravity really equal to the speed of light?

The result of this experiment is important enough that I thought about making this a separate article. If you read this as a separate article, you'll know that it grew beyond what I expected when I wrote this paragraph. Here is what the national media reported:

On September 8, 2002, Jupiter passed nearly directly in front of the quasar J0842+1835, a star-like object that is a strong emitter of radio waves. (The name, *quasar*, came from the contraction QSR, which stood for quasi-stellar radio source. The story goes that when a Chinese astronomer saw the acronym, he naturally pronounced it as "quasar," Chinese having no vowels. The pronunciation stuck.)

A team led by Sergei Kopeikin of the National Radio Astronomy Observatory used the event to check on the speed of gravity. Two years prior, Kopeikin had proposed using the alignment of Jupiter and a collection of quasars to measure the speed of gravity.[8] Kopeikin's team used a network of radio telescopes around the world to obtain a "stereo" collection of the gravity field distortions caused by the propagation of gravity effect proposed in his paper. They used radio telescopes in the Virgin Islands, New Mexico, Germany, and Hawaii to watch as light from Jupiter tugged on the light streaming past from the distant quasar.



Kopeikin presented his results in Seattle on 8 January. The press from around the world carried the news of the project. Kopeikin was surprised at the interest represented by reporters worldwide who contacted

[8] Kopeikin, S., 2001. "Testing the relativistic effect of the propagation of gravity by a very long baseline interferometry," *Astrophysical Journal*, **556**:L1-L5.

him. The results were submitted for publication in December.[9] "We have determined that gravity's propagation speed is equal to the speed of light within an accuracy of 20 percent," said Kopeikin. He added that Einstein was basically correct, but neglected to include a slight bending of radio waves in his computation. His results are to be published in the April 10 issue of the *Astrophysical Journal Letters*. So much the media story.

In past issues of *The Biblical Astronomer*, we have referred to astronomer Thomas van Flandern's claim that the speed of gravity is practically infinite. Little or no opposition to the result was presented in the popular media. Thomas van Flandern's web site told a different story, however.[10] In his press release, van Flandern says:

> New findings announced today by S. Kopeikin are invalid by both experimental and theoretical standards. They do a disservice to science in general and the advancement of physics in particular because the announced findings do not represent the meaning of an actual experimental result and cannot possibly represent the physical quantity heretofore called "the speed of gravity," which has already been proved by six experiments to propagate much faster than light, perhaps billions of times faster.
>
> In 2001, S. Kopeikin proposed an experiment to test the speed of gravity.[8] However, his result as described would have been a hybrid of near-instantaneous effects and lightspeed-delayed effects. The physical interpretation in his proposal (not the math or the experiment itself) was objected to by T. van Flandern[11] and independently by H. Asada.[12] The experiment was then funded and carried out in 2002 September, with results initially expected last October. When no results were forthcoming yet in December, a rumor began circulating in USENET newsgroup sci.physics that the results were not coming out in accord with expectations and were being scrutinized. On December 30, Kopeikin posted a new paper on the Internet containing new algorithms and formulas for the analysis, [9] incompatible with his own pre-observation published formulas. On 2003 January 8, he gave an oral talk at the Seattle meeting of the American Astronomical Society (AAS) announcing his numerical

[9] Kopeikin, S., 2002. http://xxx.lanl.gov/abs/gr-qc/0212121. This is the preprint.
[10] http://www.metaresearch.org.
[11] Van Flandern, t., 2002. http://metaresearch.org/home/viewpoint/Kopeikin.asp.
[12] Asada, H., 2002. *Astrophys. J.*, **574**:L69-L70.

results, continuing to claim that they measured "the speed of gravity": $c_g=(0.95\pm0.25)$ c where c is the speed of light.[13]

Van Flandern simplifies the experiment's result by saying that, "Although gravitation and relativity are technical subjects, the mistake made by Kopeikin is not unlike measuring the speed of a falling apple and claiming that is the speed of gravity.

"All gravitational phenomena unique to Einstein's relativity (GR), such as light bending, gravitational redshift, perihelion advance, and Shapiro delay[14] of radio or radar signals, arise in a static or near-static gravitational potential field, also sometimes called in various contexts by the names "the gravitational field," "space-time medium," "the light-carrying medium," "æther," or "Elysium." Disturbances of this potential field or medium are called "gravitational waves." According to GR, such waves propagate at the speed of light, as do all other phenomena associated with the potential field that propagate at all. This speed has been confirmed indirectly by binary pulsar observations. There is no current dispute about this, and no expectation of any other result for the propagation speed of gravitational waves. However, the name notwithstanding, "gravitational waves" have nothing to do with gravitational force. They are ultra-weak disturbances of the potential field or space-time medium due to acceleration of bodies. So far, they have proved too weak to detect directly in any laboratory or astrophysical experiment. They are certainly far too weak to have any influence on any macroscopic body in their path."

Van Flandern continues presenting more such problems with Kopeikin's interpretation of the experiment. Noting that the potential field slows clocks, bends or slows the speed of light, he points out that the gravitational force exhibits no such effects, even when fields as strong as 10^{19} times the force of the earth's gravity are involved. Tom furthermore notes that Kopeikin's new formalism "now rules out the possibility of c_g = infinity or $c_g >> c$ ['>>' reads as 'very much greater than,' –*ed*.] in his results even before the experiment is performed. Here is why. Kopeikin now defines a new time $\tau = (c/c_g)t$ to replace the coordinate time t in the Einstein equation. However, because (c/c_g) is obviously forced to become very small or zero for large or infinite c_g, the role of the time coordinate is

[13] Van Flandern, T., 2003. "The speed of gravity," *Meta Research Press Release* 2003/01/08, http://www.metaresearch.org/media%20and%20links/press/SOG-Kopeikin.asp

[14] A delay in the time a radar echo takes to return from a planet, particularly Mercury. The delay is due to refraction of the light caused by the increasing density of the gravitational field as one approaches the sun.

diminished or suppressed altogether by his substitution, which effectively eliminates many relativistic effects already verified in other experiments."

So what is the bottom line? Van Flandern has demolished Kopeikin's claim and shown that what Kopeikin et al. measured had nothing to do with the propagation speed of gravity. Interestingly, after the summary of his paper, van Flandern reports the following under the title "Significance to the public supporting the research":

> Contrary to Kopeikin's announced result, reference [10][15] shows that the speed of light is no longer a universal speed limit. Travel and communication at unlimited speeds are now possible. These take place in forward time, creating no paradoxes. (E.g., you can't go back in time and kill your own grandfather when he was still a child.) Nothing at all about the mathematical theory of relativity is altered. However, the experimental interpretation of special relativity now favors Lorentz's version over Einstein's. And the experimental interpretation of general relativity now favors the force interpretation (as preferred by Einstein, Dirac, and Feynman, among others) over the geometric interpretation ("curved space-time").

At the time of this writing, 17 April, the consensus of physicists is that Kopeikin did not measure the speed of gravity.

Little Big Bang stumps scientists

The Relativity Heavy Ion Collider (RHIC), a cyclotron made up of 1,600 miles of superconducting wire arranged in a 2.4-mile circumference ring with thousands of magnets immersed in liquid helium at a temperature 4.5 K, presented particle physics with its latest mystery. By smashing together atoms to produce conditions similar to those theorized in the first cosmic moments of the presumed big bang, physicists discovered some "startling results" that could force them to rethink their understanding of the universe, not to mention particle physics.

The atomic collisions produced the expected temperature some tens of thousands of times hotter than theory predicts for the cores of the hottest stars, but particles streamed from the hot plasma soup in surprising patterns, leading the researchers to doubt fundamental theories about how subatomic particles (protons, electrons, neutrons, quarks, etc.) behave.

Steven Manly, of the University of Rochester in New York, and colleagues conducted their experiment at the RHIC in Brookhaven, New

[15] Van Flandern, T., & J. P. Vigier, 2002. "Experimental repeal of the speed limit for gravitational, electrodynamic, and quantum field interactions," *Found. Phys.*, **32**:1031-1068.

York, sending separate beams of gold ions at nearly light-speed crashing into each other. The collision briefly produced a quark-gluon plasma, an exotic mixture of ultra-hot particles, giving physicists a glimpse into the interaction of energy, matter, and the strong nuclear force. The strong force is said to bind atoms together. Almost predictably, it is the existence of the strong force that is cast into doubt by the experiment.

The subatomic particles knocked out of their container particles, streamed out of the plasma soup with considerable haste. But the manner in which they left indicated a problem with the models of the strong force.

"We've been handed some new pieces of the puzzle and we're trying to figure out how this new picture fits together." Manly said.

The mysterious data could help unlock some big cosmic secrets. Cooling plasma might be responsible for giving matter its mass, just as condensing steam produces water. "It may be that we have an actual clue here that something fundamental is different, something we just don't understand -- yet," Manly said.

Jupiter-like planets formed in hundreds of years[16]

The Nebular Hypothesis for the formation of the Solar System has been the "scientific" explanation for the formation of the planets ever since the occultist, Immanuel Swedenborg, received it from the inhabitants of Mars and the Moon during a séance. In the mad quest for a much-much-much-ever-so-many-muches greater age for the cosmos than 6,000 years, evolutionists have long insisted that it takes from one to ten million years for gas giant planets such as Jupiter and Saturn to form from the cosmic debris circling a young star. Despite the fact that the model has never worked, mathematically, a new version brings the time much closer to a day than to 5,000,000 years. New research reported by Thomas R. Quinn of the University of Washington suggests such planets form in as little as "a few hundred years."

"If a gas giant planet can't form quickly, it probably won't form at all," Quinn said. The "standard" model of planet formation holds that the spinning disk of matter, called a protoplanetary disk, that surrounds a young star gradually congeals into masses that form the cores of planets.

The alert reader will note that in the first sentence, we find a tacit admission that the "standard model" does not work.

The Nebular Hypothesis process maintained it would take a million years or so to form, and the giants gradually accumulate their large gaseous envelopes over *perhaps* another 1 million to 10 million years. But the

[16] Stricherz, Vince., 2002. "Jupiter-like planets formed in hundreds–not millions–of years study shows," NASA Press Release, 28 Nov.

new research, culled from a much-refined mathematical model, suggests that the protoplanetary disk begins to fragment after just a few spins around its star. Now a few spins takes decades, not centuries; but that is not important in this discussion.

"If these planets can't form quickly, then they should be a relatively rare phenomenon," said Quinn. The existence of gas giant planets, it turns out, seems to be fairly common. Since the mid-1990s, researchers have discovered more than 100 planets, generally from the mass of Jupiter to 10 times that size, orbiting stars outside the solar system. Those planets were deduced by their gravitational effect on their parent stars, and their discovery lends credence to the new research, meaning rapid formation.

Now, since the early 1950s some scientists have entertained the notion that gas giant planets were formed quickly. This they did because the standard model took too long, meaning the "cloud" would evaporate before the planets could form. The new model, of course, "fixes" that problem by using a specialized fluid dynamics simulation.

The new model explains why two other giant planets in our system, Uranus and Neptune, don't have gas envelopes like Jupiter and Saturn, Quinn said. At the time those planets were being formed, the solar system was part of a star cluster. The outer planets of Uranus and Neptune were too close to a nearby star–one that has since migrated away–and therefore lost whatever gas envelopes they might have accumulated. Of course, the old model could invoke the same hypothesis to rescue itself from the problem the outer planets present.

No evolutionary model yet accounts for why most of the giant gaseous planets found outside the solar system are much nearer their suns than are Jupiter and Saturn. Apparently the earth is in a special place, after all. The most common belief currently is that the planets formed farther away from their stars and then migrated inward to the positions where they have been discovered. One is not to ask how far Jupiter and Saturn may have drifted inward to the sun and when are they likely to fall into the sun. Maybe astronomers should look for such collisions where giant planets fall into their suns.

The new model also cannot account for the formation of terrestrial planets, like earth and Mars, near our sun. Quinn retreats to the standard planet-formation model. On the other hand, it is equally possible that they formed in a much shorter time than even hundreds of years.

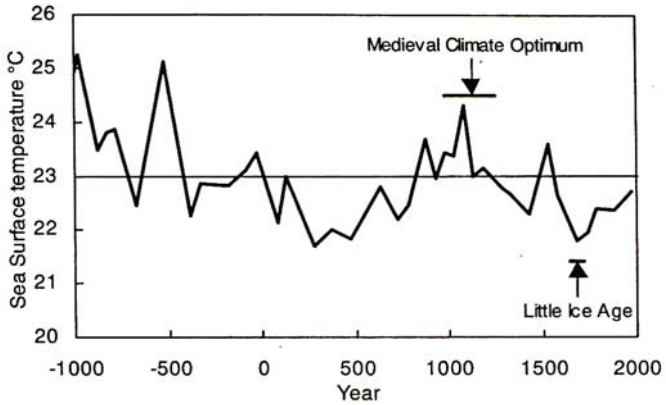
More on the mysterious change in the earth's gravity field

In last issue's "Panorama," we reported that the bulge at the earth's

equator seemed to be growing.[17] We looked at the possibility that the rebound of the earth's crust after the ice age could be the cause, and found no satisfactory solution. Now, in the 6 December 2002 issue of *Science* we find a little more on this problem.[18]

First off, we find that the crustal rebound is still upward-bound. It has yet to peak. What the group did find in their report is that, according to Dickey, "The rapid surge in glacial melting and changes in oceanic mass distribution in 1997-98 coincided with an intense El Niño, and with the highest global mean surface air temperatures on record. The world is certainly changing in a major way. … The links between these relatively rapid mass shifts and concurrent climate anomalies, however, remain to be established."

The reader probably noticed a sense of alarm in the above quote. True, the earth's climate is getting warmer, but I must note that the record of world temperatures goes back only about 130 years. For temperatures earlier than that, we must use indirect means of estimating the temperature. When we do that, we find that the earth's temperature is indeed increasing, but it is still below the average temperature of the last 3,000 years, as shown in the figure below.



If one looks over the past 3,000 years, it is apparent that there is a trend towards global cooling more than global warming. The "record" mentioned above spans roughly the last 1/8th inch of the line.

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[17] Panorama, 2003. "A mysterious large change in earth's gravity field recorded," *B.A.*, **13**(103):20-21.

[18] Dickey, J. O., S.L. Marcus, O. de Viron, & I. Fukumori, 2002. "Recent earth oblateness variations: unraveling climate and postglacial rebound effects," *Science*, **298**(5600):1975-1977.

THE BIRTH OF MODERN SCIENCE

Why did modern physics begin in Early Modern Europe?

I. Bartholomew P. Dobson

Introduction

For the past half a millennium, scientific advance and development have continued almost uninterrupted in the West. As a consequence, the assumptions of modern science in general are accepted uncritically across the twenty-first century western world. Assumptions that the universe is governed by natural laws, that these laws do not change over time, and mankind not only *can*, but *ought to* understand and formulate these laws purely through studying the universe itself are accepted without thinking. However, assumptions they remain; and just as we seem to accept them without thinking even to consider their validity, so it appears that the vast majority of mankind throughout the vast majority of his history did not think even to consider them at all. Indeed, it can be said without much opposition that modern science in general, and modern physics in particular, were born in Early Modern Europe alone.

So, the question must be asked, "Why?" This question becomes especially poignant when it is considered that other peoples in other lands at other times have been more advanced, and seemed, superficially at least, to have been better placed to give birth to modern physics than late Medieval Europeans. In particular, both the Chinese and Arab empires were more advanced than their European counterparts for most of the Middle Ages – indeed, Medieval Islam brought forth all the aspects of investigation that we might identify as modern science itself. However, this child died in its infancy. Not only was such endeavour equalled and then continually surpassed by Europeans of the Modern era, but it was apparently killed off by the very mother who bore it.

But before going on to try to understand why modern physics began in the time and place that it did, we must understand exactly what modern physics *is*. In this essay, "modern physics" is used to mean, "the seeking to formulate natural laws (which are assumed to exist) underlying the physical universe by constructing models to explain them, and using experimentation on the physical world to verify them." Specifically, it must be distinguished from both natural philosophy and engineering. Firstly, natural philosophy (as pursued by the Ancient Greeks) sought to determine the realities of the natural world

by using reasoned argument and logic. Although similar to modern physics – it assumed that the laws underlying universe could be comprehended, and that they *ought* to be investigated – it was not "modern," for it denied almost any place for experimentation. Secondly, modern physics not engineering or technology, either. Many peoples throughout history have managed to build great structures and machines, but inquiry into the principles behind *why* such designs should have worked they way they did seems to have been totally absent. Indeed, the combination of both theory and experiment seems only to have begun (at least in a manner that was to be continued by others) in the inclined-slope experiments of Galileo Galilei (1564-1642). This essay will question why such endeavour neither began nor continued within other, apparently better equipped peoples or times, and attempt to answer, albeit in a limited fashion, why it began successfully in Early Modern Europe.

Civilisation

It is perhaps obvious, but firstly it must be observed that the climate for the rise of modern physics could have been found only within a civilised or urbanised society – i.e. one whose citizens were found together in relatively static settlements. Such a society had many advantages over the classical nomadic one, which moved from place to place to find food. Such a system provided little incentive to grow crops, for land was not considered owned by any individual. In fact, it would have been almost impossible, for the people would not remain in the same place long enough to tend the fields between the sowing of the seeds and the harvest. Without this there was very little opportunity for individuals to produce any surplus, and they chose rather to move elsewhere as soon as food ran out. Consequently, such people would become almost subsistent, and what surplus could be generated subsequently traded in a barter economy. This in turn would ensure that the society remained comparatively poor, with wealth being measured in easily transportable goods such as livestock, rather than material possessions.[1]

On the other hand, of course, the growing of crops was both possible and vital in the survival of urbanised societies. Where people owned their own land there was greater incentive to grow crops and produce surplus, which could then be traded. Consequently there would be more food available, allowing some of those living in cities to en-

[1] An example of this can be seen in the Biblical account of the nomad Abram, whose wealth is expressed thus: "and he had sheep, and oxen, and he asses, and menservants, and maidservants, and she asses, and camels." (Genesis 12:16b.)

gage in more specialised services required by others in the city. These workmen would then use their profits to purchase food surpluses in order to survive, something made much easier with the introduction of money. The money economy in turn made trade easier, for it did not require the buyer to own any particular goods desired by the seller, thus increasing the wealth of the society.[2]

This is all vital because the rise of modern science would probably never have been possible within a poor society. Wealth, as explained, helps give rise to non-vital professions – and the scientist is certainly one of these. What is more, potential scientists need some incentive to use their time observing or contemplating the universe, something not readily present if one must work the land in order survive! Indeed, scientists generally do not produce any goods that can be traded, so they must be supported by wealthy patrons or institutions. Such potential patrons would be very much fewer in nomadic societies, and such institutions, such as static universities, almost impossible due to the constant travelling of nomadic life. Also, preserving the work of previous scientists is much more difficult in nomadic societies, for records cannot be housed in libraries or other permanent buildings. Besides, unless a society's members were wealthy, then recording media such as paper would have been unavailable to them.

This conclusion is reinforced historically. Firstly, it helps explain why there is no record of any early physics amongst the nomadic Arabs; yet after they had given up their nomadic lifestyle, and become rich, they produced various models of the solar system and even began (with Ibn al-Haytham) the experimental method. Secondly, it helps understand why the Mongols did no such thing. For, although in the Middle Ages they conquered even more lands than had the Arabs (including territory where there had been previous early scientific thought, such as China, and even the Arab land of Mesopotamia), they remained predominately nomadic.[3] Thirdly, it helps to understand why philosophical speculation began in Ancient Greece, where there was a rich, urbanised and successful trading society around 600 B.C. and onwards; and fourthly, it helps understand the situation in Early Modern Europe.

Medieval European societies were not generally nomadic, but nor were they particularly wealthy. The Western Roman Empire had fallen, and feudalism was eventually set up across Europe. In this system, common men were required to work the land of their lords, and fight for them in times of war, in return for small plots of land. This was

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[2] Smith, Adam, 1999 (1776). *The Wealth of Nations, Books I-III*, Penguin Books, particularly pp. 126-132.

[3] Davis, R. H. C., 1970 (1957). *A History of Medieval Europe*, Longman Group Limited, pp. 404 & 408.

quite inefficient, for there was little incentive for them to harvest much food in the lord's lands (since it did not belong to them), and yet the time spent there prevented them from making the most from their own lands. As a result, it hindered both the economic development and money economy of Europe, making modern physics less likely to appear.

However, in the mid-fourteenth century, Europe witnessed the first outbreak of the Black Death, reaching England in 1348, and becoming endemic until 1665. Such was its ferocity that between one third and one half of Europe's population was annihilated.[4] Such a situation created a severe shortage of manpower to both fight wars and work the land. This accelerated the desire of lords to pay the king money, scutage, instead of raising troops, and also to pay their workers, whose services were now very much more in demand. It increased the need to produce food more efficiently, leading to the establishment of enclosures in fields and the common land, and also drove people into towns and cities to seek their fortunes, increasing specialised employment. Thus all these results of the Black Death helped bring about the death of the feudal system, and the dominance of the money economy in Europe. This helped increase trade and ensured that European societies were appreciably wealthier in the Early Modern era than they had been in the Middle Ages, facilitating the rise of early modern science.

However, this explanation is far from complete. The Ancient Egyptians, Babylonians, Romans, Aztecs and others possessed very wealthy, urbanised empires at times, but apparently made no moves towards modern physics at all. Likewise, the Chinese possessed a strong and wealthy empire for centuries with little more success. Obviously, then, wealth is only the beginning of the answer.

Paper, Printing, and the Transmission of Science

It is very important to recognise that physics is built upon the works of others, for no man can be capable of reproducing all the worthwhile work and insights of those who went before him. Rather, a physicist produces more data, and refines (or otherwise) the models of his predecessors. It is for this reason that it is imperative that scientists both record their works and transmit them. It is quite conceivable that many hundreds of people in every culture around the world have had important insights into the workings of the universe, and perhaps even performed experiments. However, unless these people and their successors had the means to, and saw the value in, preserving records of their

[4] Kenyon, J.P., 1994. *Dictionary of British History*, Market House Books Ltd., p.41&157.

work, there could be no advance in their studies. It stands to reason, then, that modern physics would never have been born in cultures without a written language, such as many of the American and African tribes. Early Modern Europe, on the other hand, had growing levels of literacy, writing being no longer the monopoly of clerics (as had generally been the case in the Middle Ages), helped by the universities and monastic schools then present.

However, just as important to the preservation and transmission of scientific ideas was the availability of a medium on which to write. Perhaps the first of these was stone, as carved in the Egyptian obelisks, although this was obviously quite immobile unsuitable for the transmission of science. Later, the Ancient Babylonians used clay tablets to record astronomical observations, the Romans used wax-coated boards and metals to write, and other Ancient peoples, European and otherwise, used leaves and tree bark. Parchment and vellum, materials manufactured from animal skins, were also in use in the Middle East from at least the second century B.C., and papyrus, and similar predecessors of paper, were invented by the Ancient Egyptians, Aztecs, Maya, Javanese and Chinese. However, true papermaking was begun in China, spreading to Baghdad by 800 A.D., and only reaching Christian Europe by the thirteenth and fourteenth centuries. This lead to a decrease in cost of the once priceless material in Early Modern Europe, enabling it to be used for "less important" purposes, such as the recording of science.[5] Although this fact does not explain why other cultures with other suitable materials did not achieve the birth of modern physics, paper was very important in Europe because "…had the expensive parchment been the only material available, the craft of printing could never have developed."[6]

The printing press had a great effect in Europe upon the spread of books in general. Again, this had been invented in China in the eleventh century, spreading to Korea one hundred years later, although its potential seems to have gone unrecognised until its introduction to Europe 1440 by Johann Gutenberg.[7] Indeed, printed books and libraries in general seem to have been held with very little esteem in China, and much intellectual heritage seems to have been lost, except in the case of the government-printed Confucian classics.[8] Similarly, Islamic society made very little use of the printing press, for these countries were very distrustful of the ordinary man, and very unwilling to allow him access

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[5] Hunter, Dard, 1997. *Collier's Encyclopaedia*, P. F. Collier & Son Ltd, **19**:416-418.
[6] *Ibid.*, p.418.
[7] Prusiner, Stanley B., 1997. *Ibid.*, p..391-392.
[8] Huff, Toby E., 1999 (1993). *The Rise of Early Modern Science*, Cambridge University Press, pp..279 & 319.

to any printed work, not even the Koran. So great was this mistrust that printing was banned by the Muslim nations, including the Ottoman Empire in 1485.[9] This was quite in contrast to the situation in Europe, where the ideas of the common man were valued much more, particularly after the Reformation. The greater reign of the printing press allowed scientists such as Copernicus, Kepler, Galileo and Newton to produce numerous copies of their works, which were then studied by other scientists, aiding the transmission of science. In fact, these different attitudes to the printing press provide very important insights into why modern physics began only in Europe.

Such transmission of science is also greatly aided if there is a common language throughout the society. This was the case in Greece, where the conquest of Alexander the Great took the Greek language across the Middle East, aiding the development of natural philosophy amongst those people long after the Empire's demise in 323 B.C. Equally, the Chinese shared a common written language, although the effect of this was greatly reduced by the restrictions on travel constantly enforced by the government, which believed that people should remain in their own towns.[10] Again, the Islamic lands were united by the Arabic language, which helped Arabic science in the same way as it had the Greeks. Similarly, the Romans ruled a vast empire, united by the common language, but that society seems to have produced no science of any description to transmit across its lands. However, the use of Latin became important after Rome's fall, for it was retained in Europe for the writing of intellectual works – such as Newton's *Principia* – well into the Modern era. Indeed, such a *lingua franca*, along with Europe's increasing wealth (which assisted European travel), was especially useful in the birth of modern physics.

Added to the transmission of science within a society, though, the transmission of science between different societies was also very important. Perhaps the first significant example of this was the transfer of the accurate Babylonian astronomical observations to Greece. Whereas the Babylonians had apparently constructed no mechanical model to explain these results (even though they made accurate astronomical predictions), the Greeks used these data to produce a mechanical model, which matured in the second century A.D. with the work of Ptolemy. In this system, each planet, the sun and the moon orbited some point close to the earth, on a *deferent*, tracing out a perfect circle. The deferent traced out a constant angular speed with respect to a further point, the *equant*, with the planet orbiting upon another circle, the *epicycle* (figure 1). This was perhaps the first example of a truly scien-

[9] *Ibid.*, p.225.
[10] *Ibid.*, p.320.

tific theory, for it explained observations with a model that could predict future observations.

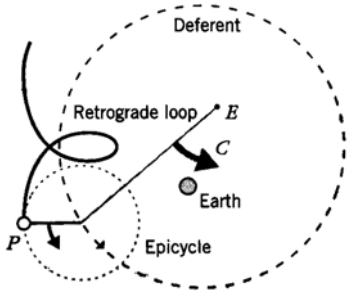

Figure 1: *The Ptolemaic model for one planet*: E is the equant, P is the planet, and C is the centre of its orbit.[11]

The seventh century A.D. saw the rise of the Arab Empire, which conquered many of the lands that Alexander had conquered a millennium earlier. This brought the Arabs into contact with many of the Greek works, which were initially given official legitimacy, and translated with vigour in Baghdad from the eighth century onwards.[12] This initial acceptance of the Greek astronomy aided Arab development due to the subsequent scientific criticism it received, the most useful of which came from the Maragha astronomers. These tried to eliminate the equant, for it was physically impossible for a sphere to rotate about an axis through its centre, and yet trace out a constant angular speed about some other point within itself, and as a result various alternative models were proposed. One of the most successful was that of Nasir al-Din al-Tusi, from the thirteenth century, which employed the "Tusi couple" – a small circle rolling at constant speed within a larger circle, twice the diameter of the first.[13]

Such inter-cultural transmission also aided European scientific development, as well as that of the Arabs and Greeks. Although the Dark Ages saw many Greek works lost to the West due to the predominance of Latin, Plato's *Timaeus* was available from the third century. This had an important effect upon later Western scientific thought, particularly from the twelfth century, for it taught that the universe was orderly and governed by natural laws. The twelfth century also saw translations of other Greek and Arabic works begun, first made possible by the capture of Islamic city of Toledo by the Christians in 1085. Within one hundred years, many great scientific works were being studied throughout European universities,[14] and Arabic numerals, introduced by Fibonacci,[15] were being employed (being much more conducive to mathematics – the language of physics – than were their Ro-

[11] Taken from Zeilik, Michael, 1998 (1997). *Astronomy: The Evolving Universe*, John Wiley & Sons, Inc., p. 35.
[12] O'Leary, D. L., 1949. *How Greek Science Passed to the Arabs,* Routledge and Kegan Paul, Limited, p. 19.
[13] Saliba, G., 1994. *A History of Arabic Astronomy*, N. Y. University Press, pp. 269-272.
[14] Huff, Toby E., *op. cit.*, p. 187.
[15] Bailie, J., et al., 1990. *Cassell Encyclopaedia Dict.*, Cassell Publishers Ltd, p.527.

man predecessors). Additionally, the continuing translation effort may have directly influenced Copernicus' heliocentric theory, for he employed the exact same Tusi couple as had the Arabs.[16]

The importance of inter-cultural influences also helps understand why modern physics did not begin in China, which remained closed to foreign sciences (although it had every opportunity to accept them).[17] However, it does not explain why such endeavour did not begin in Rome, which had the same access to the Greek works as had the Arabs, nor does it explain why Arab physics died away.

Universities

One of the most important factors in the development of any discipline is the ability of interested people to discuss and continue that work together. In the case of the sciences, one of earliest of these was the Plato's Academy, founded in 387 B.C., which provided support for philosophers, enabling them to engage and record their ideas. It was here that Aristotle studied, achieving much in many areas of philosophy, though his most important contribution (to physics, at least) was his assumption that mankind could discover the truth about the physical universe. Such institutions thrived in Greece, advancing natural philosophy and producing many other capable thinkers with important attitudes (if not conclusions), until abolished by Justinian in 529 A.D.[18]

When the Arabs conquered many of the Roman lands, they too established centres of learning, of which the most important was the madrassa, dating from at least the ninth century. These were pious endowments, established by wealthy donors, whose original intentions the madrassa had to continually follow, having been legally approved as being in agreement with Islamic law. However, this meant nothing deemed to be opposed to Islam could be undertaken, which led in the eleventh century to the scientific works of the Ancient Greeks being banned throughout the Islamic world. Indeed, al-Mansur, ruler of North Africa and Spain (1184-99), had all "foreign science" books burned, and all those who studied them killed; although in more normal times they were studied privately, or secretly from professors who had mastered them themselves.[19] The problem with this ban was not the disbelief in Aristotle – for many of his ideas were completely false – but that it hindered the production of *alternative* naturalistic theories. Addition-

[16] Kennedy, E. S., 1998. *Astronomy and Astrology in the Islamic World*, Ashgate Publishing Limited, pp..22-23.
[17] Huff, Toby E., *op. cit.*, p.239.
[18] DeHoan, R., 1997. *Collier's Encyclopaedia*, P. F. Collier & Son Limited, Vol. 1, p.57.
[19] Huff, Toby E., *op. cit.*, p.153.

ally, the madrassa system had other problems, particularly since each pupil studied under only one master, with no set curriculum. As Huff states, "The lack of outside supervision…could lead to untoward consequences, above all the widespread prevalence of charlatanism and quackery."[20]

However, whereas the individuality of Islamic tuition was problematic, the opposite situation was even more so in China. Chinese education was rigidly controlled by the state, and when the government established schools in every Chinese district in the eleventh century, the curriculum consisted entirely of learning the Confucian classics, which focused on the moral conduct of rulers. Knowledge of these alone was vital to pass the government examinations, which provided ambitious students their only opportunity to reach the upper-classes, and thus were pursued at the expense of all other studies. Additionally, there were no real universities in China, for even the imperial universities had few staff or students, and were not at all autonomous. However, mathematics and astronomy did have state support at times, but only within strict bounds. Indeed, in 1386, sixty-eight metropolitan degree holders were put to death by the emperor for refusing "…to serve the government when summoned."[21] Such actions could hardly have encouraged university learning.

However, the situation in Medieval Europe was much different. Due to a legal revolution in the twelfth and thirteenth centuries, induced by the rediscovery of Justinian (Roman) Law,[22] the concept of *corporation* became legally enshrined. This gave institutions, such as universities, legal rights independent of their original founders, giving them both protection and freedom to pursue their own choice of study in a way impossible in China or the Muslim world. Indeed, the aforementioned translation feat of foreign scientific works in the twelfth century was carried out in the European Universities. However, this did not prevent Aristotle's teachings – principally the notion that the earth had no beginning – from being condemned in Paris University in 1277, although unlike the Muslim situation, this was annulled less than fifty years later. In fact, this condemnation may actually have aided science, since it encouraged theologians to imagine non-Aristotelian scenarios, helping lead to the overthrow of some of his false teachings. Finally, unlike in the madrassa, the European university student learnt from an entire faculty, including evaluators from other universities. Thus, provided that the set curriculum included a fair amount of science (which it usually did), students were guaranteed a good education in natural

[20] *Ibid.*, p.77.
[21] *Ibid.*, p.318.
[22] *Ibid.*, p.123.

philosophy. In this manner, knowledge of and interest in science was greatly increased in late Medieval Europe in a manner not possible elsewhere, paving the way for the birth of modern physics. However, this fails to explain why science jumped from philosophy to experiment, for university physics remained in the domain of natural philosophy for long into the Modern era.[23]

The Christian World-View

The first Christians seem to have had no interest in philosophy (though in light of their persistent persecution and desire to evangelise, such is hardly surprising). Indeed, the Bible contained strong warnings against it, including: "Beware lest any man spoil you through philosophy and vain deceit, after the tradition of men, after the rudiments of the world, and not after Christ."[24] However, not all aspects of Greek philosophy ran contrary to biblical theology. For example, Plato's *Timaeus* taught that the universe was harmonious and governed by natural laws, and although this was not explicitly taught in Scripture, it was entirely consistent with it. For, if an unchanging God both created and continually upholds the universe, one might expect the universe to follow a series of unchanging principles – the most important assumption of modern physics. It may have been for this reason, despite the Bible's warnings, that Plato's book was accepted by Augustine, and then throughout Medieval Europe. Such an assumption would have had no foundation if the world was considered controlled by a host of quarrelling, capricious deities (as was imagined by most pagan cultures), and any investigation in physics would thus have been difficult even to contemplate. Of course, one may argue that Christianity had no right to assume an unchanging universe because God could still change it at His whim; though a study of the Bible will show that miracles were considered exceptional.

Indeed, other axioms of modern physics were entirely consistent with biblical teaching. For example, the idea that God was personal and created man in His image reinforced the notion that people could discover truth about His creation – something that would have been absent had the universe been considered controlled by some "force," such as the Chinese Yin and Yang. Secondly, the scriptural command to subdue the earth[25] was much more conducive to controlled experi-

[23] *Ibid.*, p.357.
[24] Colossians 2:8,
[25] And God blessed them [man and woman], and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the

mentation than was the pantheistic view, where man was seen as only another part of the world, with no right to tamper, and where tampering with the earth was considered tampering with God. Thirdly, consider the following promise of the unchanging Christian God: "While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease."[26] This promise was quite contrary to the widespread pagan attitude that one had to perform rites to the gods in order for spring to return, or the Aztec belief that a ball game had to be played to ensure the sun arose the next day. Indeed, since the motions of the heavens were considered dependent upon human activity, it is not surprising that almost no planetary models were ever produced, not even by keen astronomers, such as the Maya. This conclusion is reinforced when it is remembered that it was a widespread pagan belief that stars were divine, so to have produced such a model would have been to limit the gods. However, the Bible (and Koran) claimed they were not gods, but creations of the one true God, which may explain why the only cultures (apart from the Greeks) known to have produced astronomical models were the Muslim East and the Christian West.

However, although *Timaeus* agreed with some biblical principles, it disagreed with many. Plato had argued that every man had reason, which he could use to discover the truth of the universe, and this argument was taken by some Catholic scholars to argue against even the statements of scripture itself.[27] Out of this grew the "two-book" theory, whereby God was said to have written two books: the Bible and the "Book of Nature." Consequently, if the Bible seemed to contradict the Book of Nature, which could be read using God's gift of reason, then the Bible could not be taken literally.[28] (Such an anti-scriptural view could be maintained because the Roman Catholics believed the literal meaning of the Bible was less authoritative than either tradition or the teachings of Church Fathers, such as Augustine). This view was very conducive to natural philosophy – Kepler and Galileo both held it – for it promised scientists the ability not just to make good models, but to discover the *truth*.[29] Actually, this attitude was probably the reason why Aristotle's work was generally accepted in Europe (for the Bible bowed to the Book of Nature, even as read by pagans), but banned by

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sea, and over the fowl of the air, and over every living thing that moveth upon the earth. (Genesis 1:28).

[26] Genesis 8:22.

[27] Huff, Toby E., *op. cit.*, pp. 103-104.

[28] This seems to mirror the view of Augustine, who first accepted Plato's work, and to whom the phrase, "The Bible is not a textbook on science," is generally attributed.

[29] This was ironic, since scientists today generally recognise that they *are* only producing models, and even if they *did* find the full truth, they wouldn't know it.

the Muslims for contradicting the Koran. Indeed, despite the Paris condemnation of 1277, some Aristotelian ideas even became Roman Catholic doctrine, and it is from this view that the infamous Galileo affair is probably best understood. The problem was not that the Book of Nature might have read differently to Scripture, but that it had already been read and found to agree with Aristotle, and Galileo could not prove otherwise.[30]

Additional evidence that the birth of modern physics was due to the Christian world-view, and not just Greek philosophy, can be seen in the work of John Philoponus, an Alexandrian Christian from the sixth century. Generally acknowledged to have been the first philosopher to combine science with monotheism and Christian theology, his works were a direct attack at many of the false Greek ideas that were only banished in Europe in the Early Modern era. Contrary to Aristotle, he taught that: stars were not divine, but were composed of the same materials as found on earth, and subject to change; the universe had a beginning; space was a vacuum; projectiles were not moved by the air they travelled through, but by an impulse imparted to them when thrown; objects did not move the way they did because of the "natural motion" of their constituents; and heavy and light bodies, if dropped from the same height, would hit the ground at the same time.[31] The fact that Aristotle's conclusions in *all* the above issues were (apparently) wrong, and yet Philoponus' *all* correct, cannot be because of his method (i.e. logical argument, the same method used by Philoponus), nor his intellect (which is universally admired), but must almost certainly have been due to his pagan presuppositions. Thus Philoponus provides excellent evidence that Christianity itself was one of the main reasons for the birth of modern physics, being much more conducive to science than paganism – even Greek paganism, which was more successful than any other.

Since the monotheistic assumptions underlying Philoponus' work were similar to those of Islam, this might also explain why Islamic science was so successful for a time; though it does not explain why it later died. Rather, this is probably best understood by the rise of *occasionalsim* in the Arab lands. According to this view, nature was not governed by natural laws upheld by God, but everything that happened was a direct result of Allah's intervening miraculous actions.[32] Such a view made naturalistic explanation of the universe almost impossible, as had the pagan ideas of capricious deities controlling the universe,

[30] That is, at least as regarded the motion of the earth. See Huff, *op. cit.*, pp. 353-355.
[31] Sambursky, S., 1973. *Dictionary of Scientific Biography*, Charles Scribner's Sons, Vol. VII, pp. 134-138.
[32] Huff, Toby E., *op. cit.*, p.88.

and was difficult to counter due to the rise in Islamic control and intolerance in the High Middle Ages.

Thus the subject of religion helps explain why almost no cultures, despite their greatness in other areas, managed to produce modern science, and why it died in Islamic society. However, it doesn't explain why natural philosophy arose in Greece, or why neither Christian Rome nor Judaism (with had very similar preconceptions) produced modern physics.

The Protestant Reformation

The beginning of the Modern Era witnessed a seismic split in the Christian world: the Protestant Reformation. Begun by Martin Luther in 1517, its aim was to reform the church back to more biblical principles. One of these was the "priesthood of all believers" – the idea that individuals could reach God and understand the Bible themselves, without a "priest" to intercede for them. This was important in the birth of modern science because individuals could now use their reason to find the truth of God's word, making them better placed to find the truth of the natural world.

The Reformation had other important implications, too. Although there had been similar attempts at such reform earlier in history, such as those of Wycliffe (in England) and Huss (in Bohemia), these "heretical" movements had eventually been put down by the Roman Catholics. However, such was not the case with Luther's reform. Indeed, rather than being destroyed, this movement was officially endorsed by national governments, with England, Scotland, Denmark, Sweden and many other countries adopting it as their state religion in the sixteenth century. With papal authority shattered in Reformed Europe, a great step towards intellectual freedom had been achieved. It must be remembered that most cultures, such as the Aztecs, Chinese, Egyptians, etc., deified their rulers, and thus in such societies to break with official teaching or traditional superstition was tantamount to heresy. A similar (but not as extreme) situation existed in Medieval Europe, where the pope was considered Christ's representative on earth, and so to contradict him meant to contradict God. However, the Reformation destroyed this authority in northern Europe, and in so doing probably weakened it in the minds of those elsewhere. This was also important because, as mentioned above, Aristotelian ideas had been officially accepted by the Roman Catholics, and enshrined in church doctrine. Even the mass, perhaps the most important dogma of Catholicism, was based upon Aristotle's claimed distinction between *accident* and *substance*.[33] So

[33] Cf. "Accident" in *Catholic Encyclopaedia*, www.newadvent.org/cathen/01096c.htm

closely was this central doctrine married to Aristotle that had the pope's authority not been so seriously challenged by the Reformers, it is conceivable that neither would Aristotle's authority have been banished by the scientists. For the new authority – that of experimental science – to claim the ascendancy, the old authority had to be overthrown.

Finally, the Reformation reinforced the scientifically advantageous principles of the Christian world-view, principally through its rejection of the supernatural in every-day affairs. For example, the attack against the miraculous appearance of Christ in the Eucharist, the healing properties of holy relics, and the posthumous miracles of saints all strengthened the idea of an unchanging universe, which in turn strengthened the expectation to find natural laws. This conclusion helps explain why neither the non-Christian nor the Eastern Orthodox countries produced modern science; for, although Christian, the latter did not experience a similar Reformation to the Catholic world.

Science as Part of a Wider Movement

In the course of this essay, many subjects have been covered in an attempt to explain why modern physics began in Early Modern Europe. These included the fall of Toledo in the eleventh century, the legal revolution of the twelfth and thirteenth centuries, the advent of paper manufacturing in the thirteenth century, the Black Death of the fourteenth century, the invention of the printing-press in the fifteenth century, and the Reformation of the sixteenth century. However, it cannot be forgotten that the birth of modern physics was just one part of a much wider movement. The Renaissance saw huge advances in art and sculpture, producing some of the finest pieces in the world. Likewise, the start of the Modern era saw huge advances in music theory, composition, and the development of the orchestra, unparalleled elsewhere. Again, the same age saw the Europeans begin exploring vast swaths of previously unknown territory, and begin the process of colonisation, leading to huge European empires. Furthermore, massive advances in technology were made, and capitalism and democracy begun. This "wider movement" as a whole eclipsed the achievements of all other societies, and is apparently without equal in all mankind's history.

So, can it be coincidence that all these diverse achievements occurred almost simultaneously? Or did the advent of one lead to the advent of all the others? I suspect that until the beginnings of all these activities are studied together, the complete explanation for the birth of modern physics cannot be known.

READERS' FORUM

By email from C. K.:

In the latest *Biblical Astronomer* (summer 2002), Dr. Bolton Davidheiser discusses the work of Dr. Hugh Ross. On p. 114, he summarizes what H. D. B. Kettlewell wrote about his experiments, with some thoughtful responses to the significance of that research. This summer science writer Judith Hooper published *Of Moths and Men*, a book on Kettlewell and his work, which points out serious problems with the work (finally criticised by scientists) and puts it perspective.

A good brief summary by Paul Raeburn is in the August 25, 2002 *New York Times*, section 7, column 3, page 12.

By email from John Arend, B.S. (Geology), M.S. (Science Education), M. Div.; Public Information Services Director of ICR–

I am writing to you for the purpose of clarifying the record regarding ICR's position on geocentrism in response to a Readers' Forum article appearing on p. 123 of *Biblical Astronomer* number 101. Unfortunately, without the name of your reader, or the date, or the specific subject he chose in emailing ICR, I am unable to retrieve it from our archives. The fact that this "42-year-old-layperson" chose to express himself in that manner rather than with ICR directly, indicates a possible different agenda is involved. Based on the nature of his remarks I believe there are some misunderstandings that need clarification. Scripturally, as a Christian, if a brother has trespassed against him he needs to "go and tell him his fault between thee and him alone...."(Mt. 18:15-18). By the same token if you believed that "ICR seems to regard both you and this subject" (geocentricity).... "with disdain," it would have been appropriate to use the same approach, rather than print several such unsubstantiated remarks. However, you were unable to do this because neither you or I know who "the good people of ICR" were that reportedly "condescendingly informed me (in part) not to rely on Gerardus Bouw's views on a rotating universe," after I had submitted the geocentricity matter to them," nor do we know who "them" is.

As Director of Public Information Services (distinct from the "in customer service" department), I field ICR's incoming email, letters, and phone calls regarding scientific or theological questions and have a small part-time staff for assistance. In the last 12 months I have tried to thoughtfully and accurately prepare, or oversee more than 8,000 such responses. I only learned about your publication from a mutual friend and was disappointed to learn that my first exposure to the Biblical Astronomer was to be

cast as one of "the bad Guys." Since I prefer to try to please God rather than men, this could be a blessing in disguise, however, I suggest that the focus be changed from "personal digs" to dealing with the scientific/biblical issues. At this point it would be premature for me to answer any questions that you may have regarding ICR's position (from your direct personal knowledge) on geocentrism until I have completed your book. In the interim, I do rely primarily on those of our scientific staff that also have their Ph D's in Astronomy. If you disagree with their written positions on the subject, I would be willing to privately receive your considered beliefs and attempt to remove all misunderstandings that stand in the way of the pursuit of truth. For example, Dr. Faulkner has made several statements regarding Geocentrism in his review of Marshall Hall's book *The Earth is Not Moving*. The review was first published in: TJ 15 (2): 36-37, 2001. Perhaps that could serve as a starting point to engage in some private irenics.

At one time I thought that Geocentrism was simply a matter of whether the earth was at the center of the universe or not. I have learned that the earth is absolutely unique in its design, placement in the universe, and ability to sustain life as we know it. Our Creator God has placed the earth near the edge of a galaxy that indeed is in the center of the all the galaxies of the universe. If you agree with that, than perhaps we are both geocentrists and that there is no conflict between Geocentrism and Creationism. I look forward to pursuing the matter further with you when I finish my own research on the topic.

John G. Arend,

My response:

I've forwarded your e-mail to my source. Hopefully, he'll make himself known. [He did, and documented his charges. *–Ed.*] He did not request anonymity, by the way. *The Biblical Astronomer* has always presumed someone wants to remain anonymous unless they otherwise make themselves known publicly or specify that they do not desire anonymity. The reason is that some are rather prominent and fear for their jobs.

Apparently you are not aware of me and confuse me with Marshall Hall, an easier geocentric opponent to refute. I have an earned Ph.D. in Astronomy, and I am the real man behind the straw man that was the subject of Faulkner's main article in the same issue of CENTJ.

To learn more, and to see my full response to Faulkner, which did not pass the CENTJ censors, see http://www.geocentricity.com. That site is a good starting place for research on geocentricity. My book is under revision, and the correction (the only one) needed is mentioned in the rebuttal to Faulkner at that site.

CREDO

The Biblical Astronomer was founded in 1971 as the Tychonian Society. It is based on the premise that the only absolutely trustworthy information about the origin and purpose of all that exists and happens is given by God, our Creator and Redeemer, in his infallible, preserved word, the Holy Bible commonly called the King James Bible. All scientific endeavor which does not accept this revelation from on high without any reservations, literary, philosophical or whatever, we reject as already condemned in its unfounded first assumptions.

We believe that the creation was completed in six twenty-four hour days and that the world is not older than about six thousand years. We maintain that the Bible teaches us of an earth that neither rotates daily nor revolves yearly about the sun; that it is at rest with respect to the throne of him who called it into existence; and that hence it is absolutely at rest in the universe.

We affirm that no man is righteous and so all are in need of salvation, which is the free gift of God, given by the grace of God, and not to be obtained through any merit or works of our own. We affirm that salvation is available only through faith in the shed blood and finished work of our risen LORD and saviour, Jesus Christ.

Lastly, the reason why we deem a return to a geocentric astronomy a first apologetic necessity is that its rejection at the beginning of our Modern Age constitutes one very important, if not the most important, cause of the historical development of Bible criticism, now resulting in an increasingly anti-Christian world in which atheistic existentialism preaches a life that is really meaningless.

If you agree with the above, please consider becoming a member. Membership dues are $25 per year. Members receive a 15% discount on all items offered for sale by the *Biblical Astronomer*.

To the law and to the testimony: if they speak not according to this word, it is because there is no light in them.

– Isaiah 8:20

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