

This is week 5 in a course of study in Science and the Bible. We are continuing our last week discussion of how

God deliberately formed his creation so that it would communicate his glory and handiwork. We got about half-way

through that discussion, so I hope we can finish it up today.

Next week I hope that we can move on to Genesis 1.

## An Introductory look at Psalm 19

Verses 1-6: The Book of God's Works

"God" = El, Elohim = God the Creator  
- The Name used in Genesis 1



Verses 7-13: The Book of God's Words

"God" = Yahweh = God the Redeemer  
- The Name used in Genesis 2-3  
(start of the redemption story)



Review: Psalm 19 talks about both the Book of God's Works and the Book of God's Words. Both books talk

about God's glory. The Book of God's Words tells us the redemption story, and we need that Book

so that we can know how to be saved from the just judgment of our sinful and rebellious nature.

Today we will continue what we started last week and show how God deliberately designed his creation

so that it can testify to his glory and craftsmanship. From this deliberate design we can infer that God

wants us to study his creation and that this Book of his Works provides a needed part of his self-revelation.

Neither book tells the full story -- otherwise God would not have done all that he did to preserve in Nature

the silent speech that testifies to his glory, his attributes (Romans 1:20) and his handiwork.

I believe, incidentally, that a lot of this silent speech is a witness to the present age -- indeed to every age,

which is one of the providential ways that God speaks -- in both of his books -- to all times, all cultures,

and all people, and is why the "dead historians" recorded thousands of

# Their *line* is gone out through all the earth.



NIV - 4 Their *voice* goes out into all the earth,  
their words to the ends of the world. (follows Septuagint)

ESV - 4 Their *measuring line* goes out through all the earth,  
and their words to the end of the world. (follows Hebrew)

Gesenius *Hebrew Lexicon* (876a):

קָו (Kav) = line, measuring-line, "their chord = music  $\psi$  19:5"

Image of a stretched line on a stringed instrument.  
As David composed this psalm, he looked down at  
his harp. The strings are stretched, and make music  
under the hands of a skillful player.

Review: In verse 4, the NIV as well as the King James and others follow the Septuagint, which translates the Hebrew word "Kav" by "voice".

The ESV follows the Hebrew, using "measuring line" which is another way to say it is taut or stretched out. In my view Gesenius' Hebrew Lexicon hits closest to the intended meaning, that of a stretched harp string. As David composed this psalm, he looked down at his harp. The strings are stretched, and make music under the hands of a skillful player.

I believe that is what this Psalm talks about.

=====

The word "where" in verse 3 is supplied in the translation. The word translated "voice" in verse 4 is literally a "line". The word is used elsewhere for a stretched-out measuring line. In this context the image is that of a tuned harp string. In my mind I picture David composing this Psalm with his harp in hand. As he composes the words and music,

## The Silent Speech of God's Book of Works

- God designed his creation so that the careful observer can learn truth about his creation. He did not have to do this.
  - the universe might have been made so that it is impossible to probe into its hidden treasures.



We briefly looked last time at some ways that God designed his creation so that it is accessible to the diligent observer. Today we will say more about this. The main point is that God might have created the world so that it is impossible to probe into its hidden treasures.

## The Silent Speech of God's Book of Works



### *The Task*

What prodigies can power divine perform  
More grand than it produces year by year,  
And all in sight of inattentive man?  
Familiar with the effect, we slight the cause,  
And, in the constancy of nature's course,  
The regular return of genial months,  
And renovation of a faded world,  
See nought to wonder at.

William Cowper, Book VI (1785)

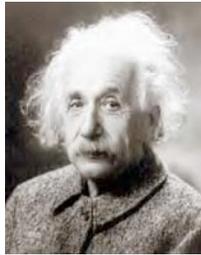
A few years ago I came across this quote of William Cowper. It seems particularly apt today.

We as humans tend to be "inattentive" to the ways that God's creation speaks of his glory and handiwork.

And in the past 50 years, that tendency has compounded because as science probes ever deeper into the microscopic world and ever farther into the reaches of the deep universe, we uncover ever greater "prodigies" of God's creation. More than ever science "slights the cause" by being blind to the voice of the

. . . " " . . . . . "

## The Comprehensible Creation



Einstein: "The most incomprehensible thing about the world is that it is at all comprehensible."

- Light reveals the microscopic world
- =>• The Dark Sky reveals the deep universe.
- Fossils and rock layers reveal Earth's history.
- Constant Laws of Physics reveal Creation history.

Last week we discussed the amazing way that God created light so that scientists could use light microscopes probe the microscopic world. If the wavelength of visible light were about the size of a small dot, then the naked eye's ability would not be affected, but the microscopic World would just be a blur. The stimulus to build microscopes and go even beyond the limits of light might never have been developed.

We also started to look at the dark sky and what that means to our ability to explore the universe outside of our own galaxy, the Milky Way.

We will pick up at that point.

## The Comprehensible Creation

- The "voice" was present everywhere, throughout history
  - The remarks in Romans apply to all ages and cultures.
  - . . . But the depth of the voice grew.
- The **depth** of the voice expands with understanding.
  - The deeper we probe the more awesome the voice,
  - . . . But it is present at every level of sophistication.
- There is (apparently) no "natural" limit to the ability of man to probe ever further into the details of God's Creation, and as he does, the glory and handiwork of God becomes ever more wondrous (But see Cowper's observation - "so they are without excuse" Rom. 1:20).

## The Silent Speech: light waves

- If visible light had a one-millimeter wavelength, we could see the period at the end of a sentence, but could not see objects much smaller than that.

=> We could see all that humans from antiquity could see,

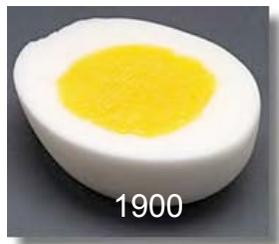
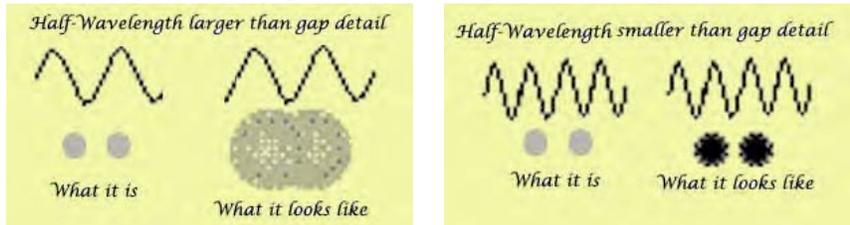
BUT microscopes would not have been invented.

- 100 years ago the wavelength of visible light seemed to limit what we could see of the microscopic world.

=> It was assumed by some scientists that the contents of a cell were "simple" *because* we could not see much detail with a light microscope. Hence, life itself must be essentially simple -- although we couldn't see the details.

# The Silent Speech: The microworld

- The wavelength of visible light



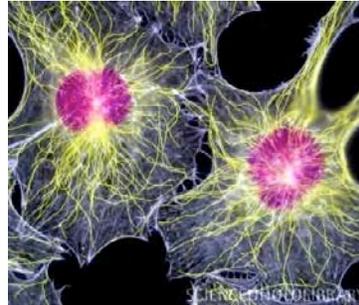
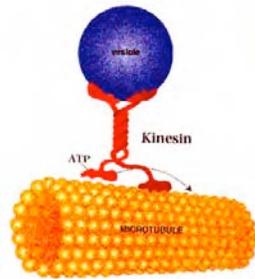
The living cell



We mentioned last time the wavelength of visible light. A hundred years ago, the cell looked like a boiled egg: the nucleus (the yolk) and the cytoplasm (the white). The reason is that the wavelength of light was too large to see the details in the cytoplasm.

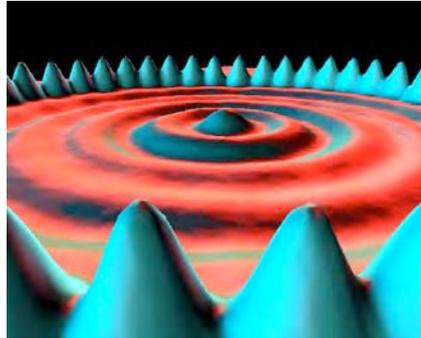
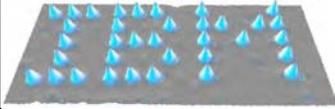
# Structure of the Cell's Cytoplasm

- Specialized organelles
- kinesin motors to transport food and waste along a "road" network called the cytoskeleton. these "roads" connect the cell organelles and the cell wall.



# The Silent Speech of God's Book of Works

- The microscopic world
  - The ability to probe far deeper than the microscope
  - in 1900 the limit was about 1000x
  - the "protoplasm" was featureless jelly
  - today we can see individual molecules

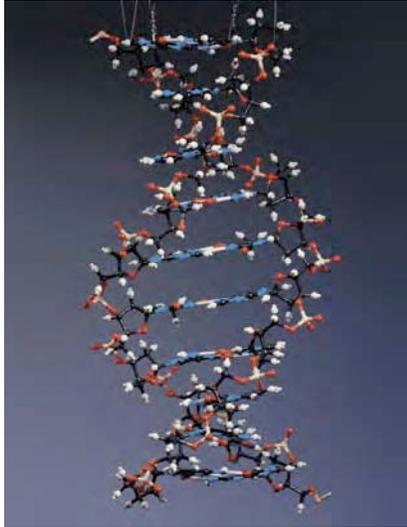


Quantum Corral - xenon molecules

==> The witness that God has put into his creation

Q; Xenon molecule or atom?

## The Silent Speech of God's Book of Works



- The genetic code
  - in 1900 genetics was a mystery (thought to be simple!)
  - today we can investigate the very source -- DNA
- The "Central Dogma" of genetics

==> The witness that God has put into his creation

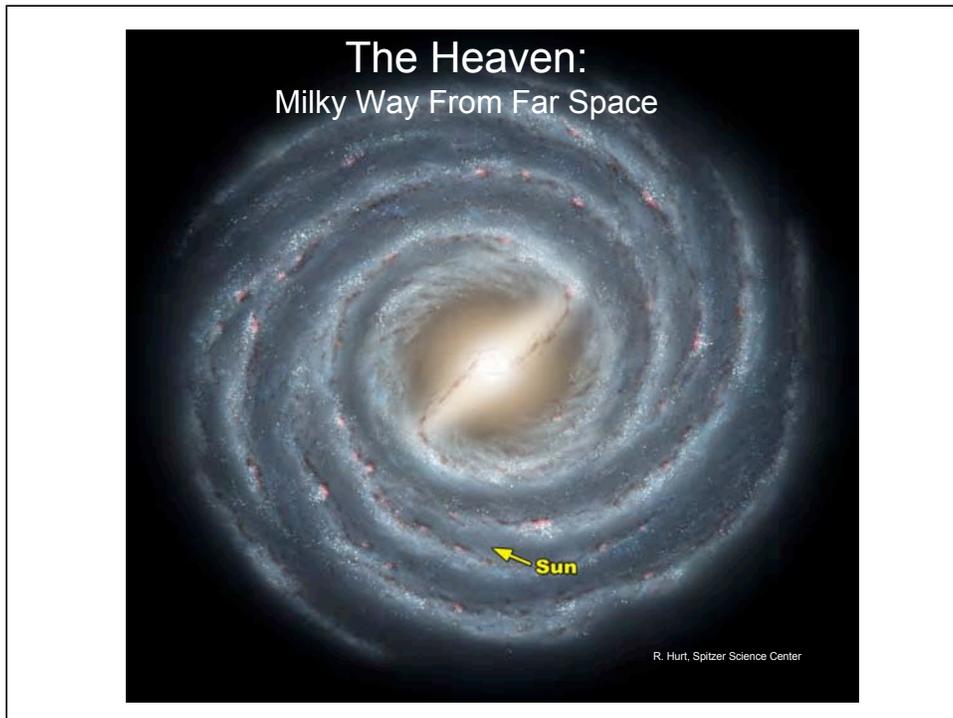
The vast complexity of genetics -- if that had been known at the time of Darwin, it would have been much harder for him to convince others of natural selection.

# The Silent Speech: Astronomy

## The deep Universe

- Astronomy
  - => The deep universe can be seen
    - we can witness the expanding universe and its past history
    - The light from the stars tells us the stars' chemical composition
      - the Comté error
      - the regularity of physics throughout the universe
    - The planets reveal the secrets of physics
      - law of gravitation
      - speed of light, etc.

==> The witness that God has put into his creation



Our Sun and its planets are in the Milky Way. We see the milky way as a milky-colored band across the sky. It is a spiral galaxy made up of about 175 billion stars. The philosopher Democritus correctly judged that the milky way is "a cluster of small stars very close together." He wrote this around 400 BC. He is also the earliest person to write that all matter is made up of atoms, which he named, appropriately, "atoma"

Our Sun is on the edge of one of the spiral arms.

The stars we can see with the naked eye are all from the milky way. The Andromeda galaxy, which is itself billions of stars, is faintly visible to the naked eye in the Andromeda constellation. It is, I believe the only visible (to the naked eye) night sky object that is outside the milky way in the Northern Hemisphere. In the Southern Hemisphere the Magellanic clouds include two visible nearby galaxies.

# The Silent Speech: Astronomy

## Nearby Star Nursery

A nearby Star Nursery -- Orion Nebula, 1300 light years away



We ended last time at this point - discussing the Orion Nebula, which is a birthplace of stars within the milky way. Lou asked an interesting question -- if this is where stars are born, then can we also watch them die?

Actually this is not a stupid question. That dark matter that we can see in the Orion Nebula is probably the left-overs of dead stars.

I also believe that there are some ??? In the Nebula -- these are, in effect, dead stars that have passed through their life.

There are a number of ways that stars can "die." [SAY MORE?]

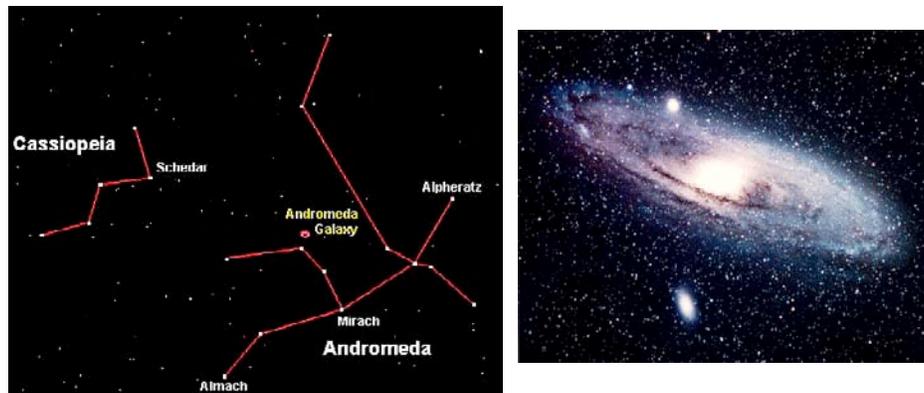


==> This shows the location of the Orion Nebula in the "sword" below Orion's belt.

Orion is easily visible on clear winter nights.

# The Silent Speech: Astronomy Beyond the Milky Way

The Andromeda galaxy is the only thing that the naked eye can see in the Northern hemisphere that is outside of our Milky Way galaxy. It is the nearest galaxy, 2.5 million light years away.



The Andromeda galaxy, visible in the Northern hemisphere, is (I believe) the only object visible to the naked eye outside of the Milky Way.

The Andromeda galaxy was first identified as a "star cloud" in 900 AD. The spiral structure was first observed by Isaac Roberts in a long-exposure photograph in 1887.

In the 1920's Hubble used the 100" Wilson Observatory to identify it as a galaxy outside of the Milky Way.

Note its position near Cassiopeia's Chair, which is quite easily identified on dark, clear nights.

## The Silent Speech: Astronomy Starlight

- Astronomy
  - The deep universe can be seen
    - we can witness the expanding universe and its past history
  - The light from the stars tells us the stars' chemical composition
    - the Comté error
    - the regularity of physics universe-wide.
  - The planets reveal the secrets of physics
    - law of gravitation
    - speed of light, etc.

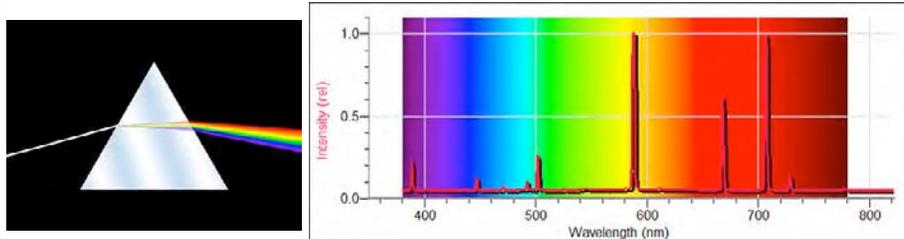
==> The witness that God has put into his creation

# The Silent Speech: Astronomy Starlight

"On the subject of stars, . . . we shall never be able by any means to determine their chemical composition or even their density."

Augusté Comte, 1835

. . . Less than 25 years later the spectrum of elements was discovered in The Sun (this is how helium was discovered). This tells us the chemical composition of the stars. It also tells us much about the physics of the distant stars.



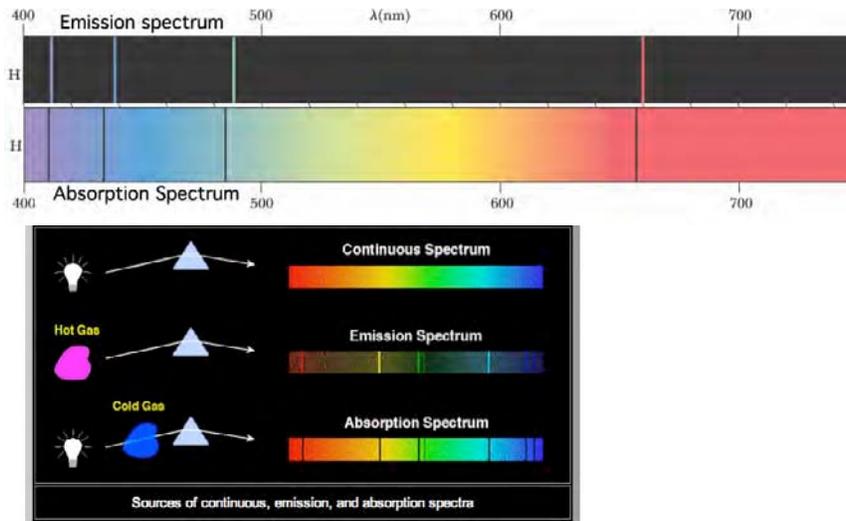
==> Comte really states what seems to be intuitively obvious. How is it possible that a person could analyse the chemistry in a star that is completely beyond reach? Well... it IS possible as we have stated. Our intuition, and Comte, are exactly wrong.

Each element has a set of spectral lines that characterize that element. These lines correspond to the energy emitted or absorbed as an electron bounces between higher or lower energy orbits as it spins around the nucleus of an element. Since only certain energy levels are Allowed, and these allowed levels are different for each element, the emitted or absorbed energy tends to show up as specific lines in the Spectrum. These "allowed" energy levels depend, in turn, on the detailed nuclear physics of the element. The fact that the spectrum of distant stars and galaxies is the same (after accounting for doppler shift) as for nearby stars and galaxies, shows that the physical constants are also the same. Hence, the starlight tells us that physics is the same everywhere in the universe.

For a discussion of the discovery of element spectra see [http://imagine.gsfc.nasa.gov/docs/science/how\\_l1/spectral\\_what.html](http://imagine.gsfc.nasa.gov/docs/science/how_l1/spectral_what.html)

# The Silent Speech: Astronomy

Hydrogen spectrum in starlight  
and the speed of light



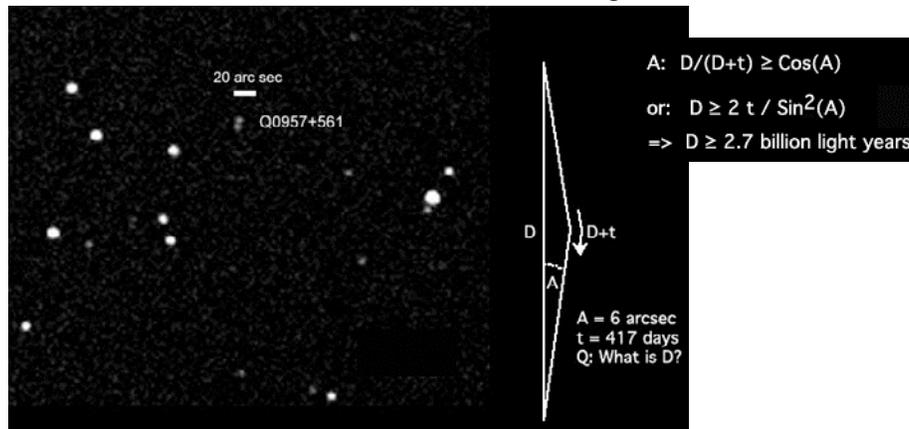
Hydrogen is the simplest of the atoms: one electron spinning around a nucleus with one proton. Since it is THE most common element in the universe, most stars, particularly younger stars, emit hydrogen spectra. The lines are very specific, but their position may shift, depending on the temperature: hotter stars shift the hydrogen spectrum to the left (higher energy, shorter wavelength).

Because the mathematics of the hydrogen atom is relatively straightforward the EXACT positions of the hydrogen lines can be computed mathematically, given the star temperature and how fast the star is moving relative to us (the doppler effect).

# The Silent Speech: Astronomy

## Double Quasar Q0957+561

### Gravitational Lensing



A quasar is a star-like object that emits radio waves. The signal varies slowly and randomly in time -- perhaps a few percent change in a month.

In 1979 a double quasar, denoted Q0957+561, was discovered which seemed to come from a single source -- the radio signals of the two quasars matched if one was delayed by 417 days. It appears that some massive object (perhaps a black hole) between us and the quasar bends the signal path so that two signals arrive at our location, separated by 6 arc seconds (6/3600 degrees). This bending is called gravitational lensing. It is something predicted by Einstein's general theory of relativity.

A straightforward geometry calculation shows that the distance to the source of the quasar(s) must be at least  $D = 2.7$  billion light years away.

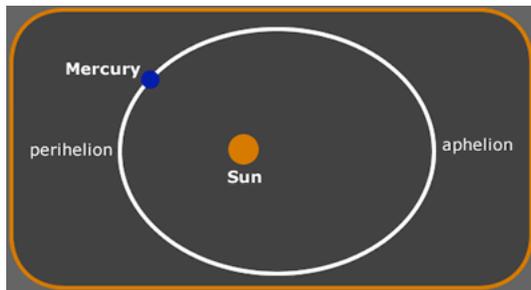
These double quasars are very rare - about 20 have been found so far.

This illustrates what I mean by the statement that the book of God's Works is not deceptive, if correctly interpreted. The implication is that the light from the source is at least 2.7 billion years old -- unless God created the light "on the way." Some evangelical christians say that is the case, but I must then ask, why would God make it possible to read such detail in his creation, if it is essentially false information?

# The Silent Speech: Astronomy

## The Planets

- Astronomy
  - The planets reveal the secrets of physics
    - => law of gravitation
    - speed of light



Kepler discovered that planets have elliptical orbits.



Johannes Kepler, 1610

==> If God hadn't included the planets in his creation, it is very likely that the Copernican revolution would never have occurred.

Copernicus

used the motion of the planets to argue that the planets orbit the sun, and so the Earth is NOT the center of the cosmos. Later, a difficult analysis of the orbits of the planets by Johannes Kepler showed that those orbits are ellipses, and Isaac Newton later showed that Kepler's three laws of planetary motion are equivalent to Newton's law of Gravity ( $F = MA$ ). This quickly led to the realization that the same law of gravitation applies throughout the entire universe. This was the start of modern physics and astronomy.

# The Silent Speech: Astronomy

## The Planets

- Astronomy
  - The planets reveal the secrets of physics
  - law of gravitation
  - => speed of light



In 1676, Ole Rømer first measured the speed of light  
By observing the moons of Jupiter



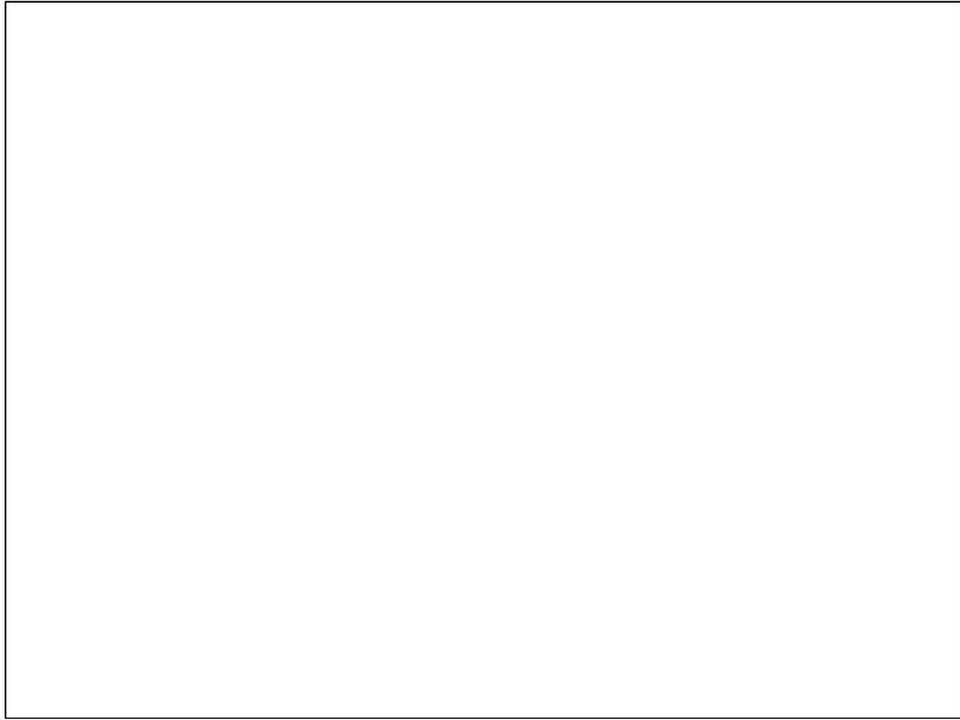
Ole Rømer

==> When Galileo first scanned the heavens with his new telescope (1612 - contemporary with Kepler), he discovered the moons of Jupiter.

The regular orbits of these moons, particularly the moon Io, moved like clockwork around Jupiter, and eclipses (as the planets passed behind Jupiter) occurred at times that could be predicted with great precision.

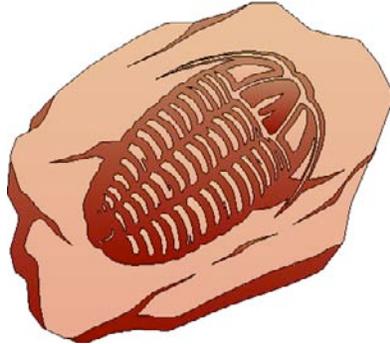
There was only one problem. When the eclipse times were observed, the times when the earth's orbit placed it nearest to Jupiter were about

8 minutes ahead of the times when the earth's orbit placed it farthest from Jupiter. The Danish



## The Silent Speech: The Geologic Record

- The geological record
  - The record of the past history of the earth
  - The record of how God created life on earth.

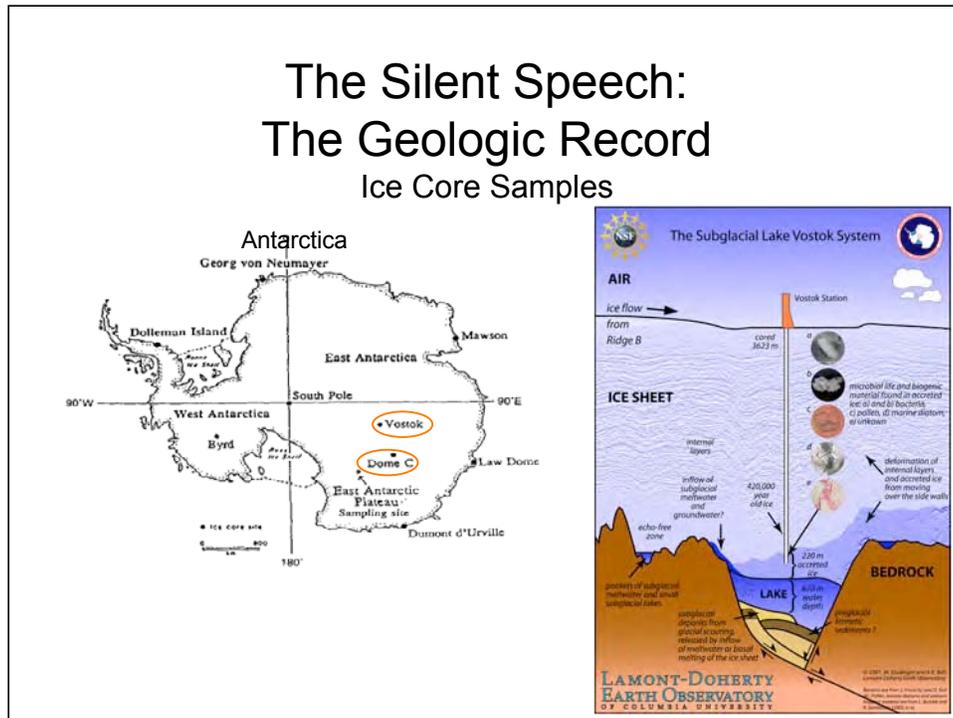


==> The witness that God has put into his creation

Will say much more at another time

It was a crisis of faith for scientists in early 1800s

# The Silent Speech: The Geologic Record Ice Core Samples

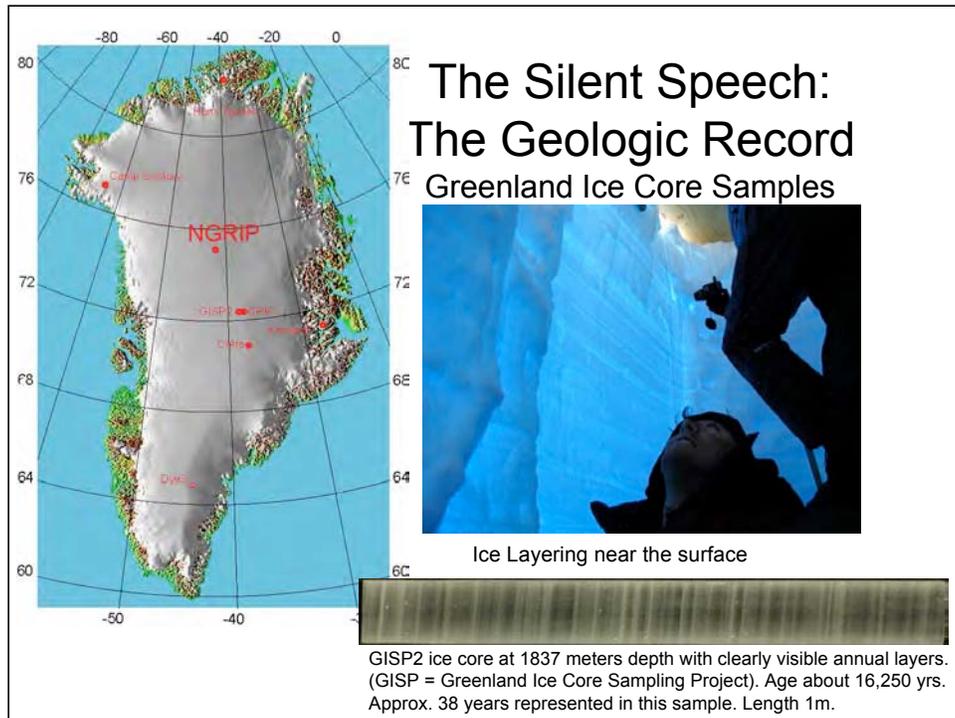


Ice cores show annual layers, and so a precise date can be found extending back thousands of years by just counting the layers.

The Vostok core sample from the Antarctic ice cap is over 3600 meters long (over 2.2 miles). The chart claims that the bottom of the core is 420,000 years old. I don't know (but doubt) that this age was found by just counting the layers. Near the top of the core, the age is a simple matter of counting the layers, but, because I understand that the layers tend to compress under the weight of the ice, and eventually they become indistinguishable. Probably other methods are used to find the age of the oldest ice.

From [answers.com/topic/icecore](http://answers.com/topic/icecore): "Upper layers of ice in a core correspond to a single year or sometimes a single season. Deeper into the ice the layers thin and annual layers become indistinguishable."

A major use of ice core research is to study the past environment, called "paleoclimate research". From <http://www.chem.hope.edu/~polik/warming/IceCore/IceCore2.html>: "Because it is warmer in summer and cooler in winter, and provided the snow layers are not too disturbed by wind, the delta value can show annual cycles. Thus, these values can be used to date the ice core. Hydrogen peroxide is created in the atmosphere by a chemical reaction that requires ultraviolet light. There is a lot less ultraviolet light in the winter than in the summer in Antarctica. Thus, measurements of hydrogen peroxide dissolved in the ice also provide a good annual



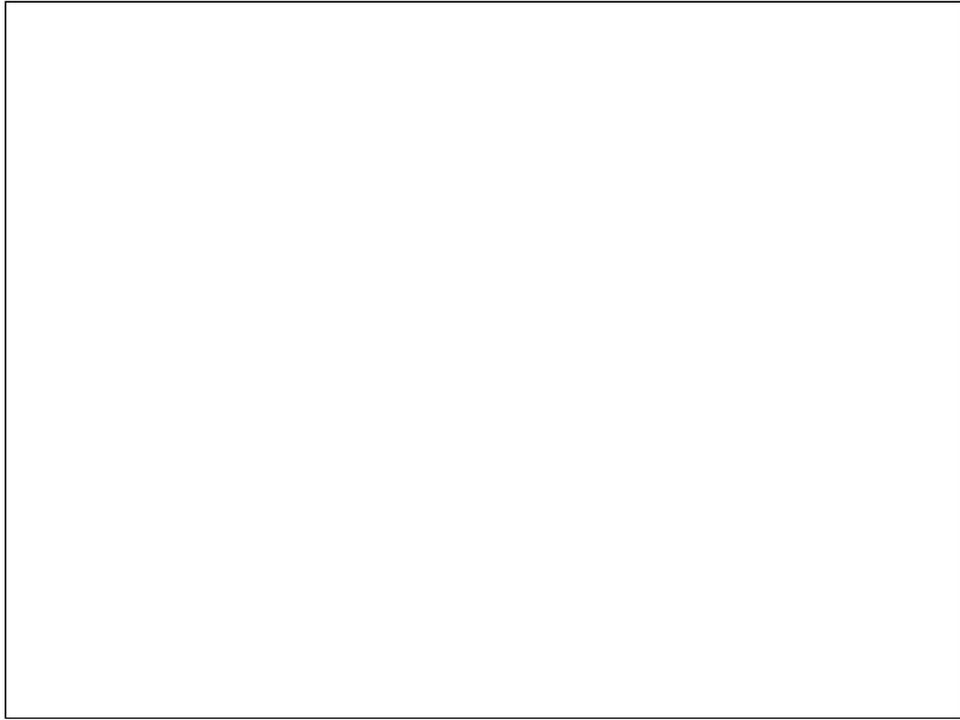
[http://www.glaciology.gfy.ku.dk/ngrip/index\\_eng.ht](http://www.glaciology.gfy.ku.dk/ngrip/index_eng.ht)

For discussion of the core sample see

[http://www.globalwarmingart.com/wiki/Image:GISP2\\_Ice\\_Core\\_jpg](http://www.globalwarmingart.com/wiki/Image:GISP2_Ice_Core_jpg).

A (preliminary) depth/age scale prepared by The National Ice Core Laboratory (Denver) provides continuous layer counting to 2811 m. corresponding to ice at least 85,000 years old. (D. Meese, CRREL, [www.gisp2.sr.unh.edu/PERSONALHTML/ajgow.html](http://www.gisp2.sr.unh.edu/PERSONALHTML/ajgow.html))

direct counting of the GISP2 ice core shows the Earth has to be more than 50,000 years old. Indirectly counted layers are more than 420,000 years old. Ice dates agree with radioactive dates and the ice layers show astronomical cycles.



## Figures of Speech in vss. 4b to 6 ...

•Do verses 4-6 say *anything* about David's "cosmology?"

-- No ... they are poetic descriptions of the marvels of God's heavens.



Sun God Helios



Orion, Taurus and Canis

Did the Greeks really believe that their constellation maps or their pantheon were "real"? Not likely!

Consider next the imagery in verses 4b to 6.

Should we assume that David had a primitive notion of the Sun, or is it just a poetic description?

Along a similar vein, what are we to make of the elaborate Greek myths about the gods? What about their fanciful construction of the constellations?

It is likely that these were mostly fanciful, poetic images used to describe "unworldly" things.

Today we use descriptive terms that do not imply anything about our scientific understanding of things -- the sun rising and setting. The leaden skies.

We often personify inanimate objects -- "the computer is being stubborn today."

When referring to such things as this Psalm, it is best to just understand what the poetic intention is, without reading into it a statement of their understanding of how things are.

## Figures of Speech in Psalm 19:4b-6

Verse 4b:

Verse 5:

Verse 6:

Returning to Psalm 19, let's first go through it verse by verse and consider the figures of speech used in the Psalm.

For now, let's include possible figures, and later we may prune down the list somewhat.

Verse 4b:

Verse 5:

Verse 6:

## Figures of Speech in Psalm 19:7-11

Verse 7:

Verse 8:

Verse 9:

Verse 10:

Verse 11:

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Verse 7:

Verse 8:

Verse 9:

Verse 10:

Verse 11:

## Figures of Speech in Psalm 19:12-14

Verse 12:

Verse 13:

Verse 14:

Returning to Psalm 19, let's first go through it verse by verse and consider the figures of speech used in the Psalm.

For now, let's include possible figures, and later we may prune down the list somewhat.

Verse 12:

Verse 13:

Verse 14: