

Considering the Depth Of the Universe By Gary Thomas

There where the dark sky flourishes is Ft. Davis, Texas, not too far south of where I-10 and I-20 intersect. Consecrated to science on top of Mt. Locke, just 16 miles from the friendly West Texas town are three pure white cathedral-like domes. The University of Texas for its isolation from city light pollution and low annual precipitation chose this unlikely remote point.

Then again, clouds and showers did prevent us from seeing night sky during our two-day visit to McDonald Observatory. We nevertheless did not feel the loss too much. Extensive exhibits, fascinating talks, and guided tours of three massive professional telescopes, including the world's largest 433-inch reflector Hobby-Eberly Telescope (HET), all kept us more than active. Besides, we would have another chance for a rainless-cloudless night on our second observatory sojourn some two States distance from McDonald.

As far back as memory takes me I recall only awe when fixing my eyes toward the twinkling bowl of outer space. A while ago, we code-named our instrument of choice "bonocs". The adult world knew them as binoculars. When not spying imaginary hostiles, we pointed these specs to the stars to reveal hundreds more specks of ethereal light.

Astronomy's most accurate estimate to date discloses more stars in the universe than all the particles of quartz on the dunes and shores of earth combined. In fact, the score is currently ten times more stars to sand with a mind boggling number of 7×10^{22} stars. (That is a seven with 22 zeroes following it).

Though a thoroughly incomprehensible number, the psalmist of old discovered the Most High has counted and named every star. That more than suggests a massive but finite number of stars as opposed to an infinite number. Otherwise, God's counting and naming would continue without end. How did pre-scientific Israelite writers know the universe was finite? Our brightest minds from Newton until Einstein held to the infinite universe theory. Recent theories predict because of the gravity of mass inside the universe that space is curved around itself into a finite sphere.

McDonald Observatory is a world-class astronomical research facility open to the public on a daily basis. (See hours on their website www.mcdonaldobservatory.org). "The Visitors Center is the check-in point for all daytime and evening visitor activities." Inside are intriguing exhibits, a comfortable theater, astronomy gift shop, and Star Date Café where you

can eat excellent quesadillas. Adjacent to the Center is Telescope Park where visitors view night objects through a couple of modest amateur telescopes under domes, weather permitting.

Though weather did not permit us much telescopic viewing, the clouds did briefly cooperate for us to see Jupiter, its Galilean moons, a double star in Leo and our sun. One of two terms we labeled “our new words” for the trip was the term “spectroscopy”. The second word “docent” means *“a person who leads guided tours especially through a museum or art gallery.”* We heard them used repeatedly during a 10-day drive through the southwest.

As your docent for the paper-ink tour before you, I would be remiss if I did not mention that being a student of the Creator’s vastly ordered symmetry of stars is an enjoyable and meaningful activity. Light and beauty stream through space awaiting observation from a backyard, a country road or an observatory. The stars provide an excellent chance for sentient beings to ask the big questions. Where do I come from? Who am I? Where am I going?

The darkness of the ancient Israel sky must have been spectacular. One of the Israelite shepherds penned a potent psalm: “The heavens are telling of the glory of God; and their expanse is declaring the work of His hands.” Their language “reveals knowledge”. Like music, starlight speaks a universal language “to the end of the world”.

The fundamental building block of Western music is a *seven*-note diatonic scale: do-re-mi-fa-sol-la-ti-do. A spectrum (think of a rainbow) is the division of white light into *seven* colors: red-orange-yellow-green-blue-indigo-violet. The Hertzsprung-Russell (H-R) diagram classifies stars into *seven* groups according to their color and temperature with the letters: OBAFGKM (O being blue hot and M, cool red). How did the biblical poets know that starlight “reveals knowledge”?

As DNA is a unique fingerprint for all life, so too stars have a unique spectral fingerprint. No two stars have the same spectrum. Stars possess different temperatures and compose different amounts and kinds of elements (mostly hydrogen and helium). “Spectroscopy” is the study of the decoding of light from distant stellar bodies.

Almost everything astronomers do involve spectroscopy in one form or another. Most hot objects like stars emit a continuous spectrum that will vary according to their temperature. Individual elements also produce a unique kind of spectrum known as emission and absorption spectrums. So not only does starlight tell temperature, it also reveals the star’s composition.

Movement of galaxies is another quantity a spectrum conveys. A spectrum shifted to the red is said to be moving away from us (thus the famous Edwin Hubble “red shift”). Shifted to the blue side of the spectrum, the galaxy is said to be moving toward us.

Recall the psalmist who made known to us that God named all the stars. Each possesses a one-of-a-kind spectral signature, similar to life (plant, animal or human) that possesses a unique DNA signature. The Most High apparently does not think of stars as nameless spheres of matter in time and space without purpose. He provides breathtaking variety within the super clusters of galaxies of stars for us to think upon and wonder.

Even we have named a portion of the stars. Betelgeuse is a name given for the supergiant red star in the shoulder of the constellation Orion. (It is cool red, signified by an M on the H-R diagram). Every star in the vastness of space displays distinctiveness and is worthy of our contemplation and study. Such knowledge enriches our view of God and the place we have in the cosmos – an intellectual contribution well worth a trip to McDonald Observatory.