The sky inspired Egyptians in science, art, and architecture. ~~~~ BY PATRICIA BLACKWELL GARY and RICHARD TALCOTT

THE GREAT PYRAMIDS CLIMB toward the night sky, where they meet what may have been their astronomical inspiration: the pyramid-shape zodiacal light.

Mention the word “pyramid,” and thoughts immediately turn to exotic locales and ancient civilizations. Several thousand years ago, people along the Nile River in Egypt built some of the world’s most impressive monuments and temples to honor their rulers and gods. Their efforts continue to inspire and intrigue us today. But
what inspired the art and architecture of the ancient Egyptians?

Unfortunately, the origins of the Egyptians' religious beliefs and how they were translated into art and architecture remain lost in the mists of prehistory. Most Egyptologists think observations of the natural world played a key role — after all, the sun-god Re was their greatest deity. We believe two icons of Egyptian architecture — the pyramid and obelisk — were inspired by previously overlooked astronomical phenomena connected with sunrise and sunset: the zodiacal light and Sun pillars, respectively.

To the ancient Egyptians, keen observers of nature during the day, it was natural to extend their observations to the one aspect of nature conspicuous at night — the star-filled sky. In the clear desert air of ancient Egypt, before the modern scourge of light pollution, the starry realm would have commanded the attention of any inquisitive person. Phenomena that typically go unnoticed today would have been obvious to anyone who looked. As in all primitive cultures, the sky was symbolic, religious, and ceremonial.

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One phenomenon quickly caught our attention. The zodiacal light has the right shape and appears both shortly before morning twilight in the east and just after evening twilight in the west. The light is a beautiful, ethereal glow that rises from the horizon in the shape of a huge pyramid or cone. The soft white light appears widest at the horizon and tapers slowly to a width of only 5° to 10°. Under the best conditions, the zodiacal light reaches halfway to the zenith.

At its most intense, the light shines slightly brighter than the central regions of the Milky Way. However, the zodiacal light appears diffuse, so any haze or background light from the Moon or a nearby city will mask its glow. That’s why most people today have never seen it — even avid observers. From the dark desert skies of ancient Egypt, however, the zodiacal light would have been conspicuous.

As its name implies, the zodiacal light tracks along the zodiac, the pattern of constellations that encompasses the apparent path of the Sun and planets across our sky, also known as the ecliptic. (Any bright planets offer a convenient guide to finding the ecliptic and seeing out the light.) The Egyptians recognized both the ecliptic and the constellations the Sun traversed, so they could have connected the zodiacal light with the Sun’s annual track.

The light appears most prominent when the ecliptic makes a steep angle to the horizon. This orients the pyramid’s apex higher in the sky and makes the glow easier to see. From the latitude of Egypt, which lies just north of the Tropic of Cancer, the ecliptic typically meets the horizon at a steep angle. Viewing conditions are slightly better on spring evenings and autumn mornings, but the difference doesn’t amount to much. (At mid-latitudes, the discrepancy grows greater, and the zodiacal light becomes difficult to see except at the favored times.)

The light may remind you of twilight — the morning vista is sometimes called the “false dawn” — but you usually can tell the difference because the zodiacal light comes to a sharper peak. The light originates with dust particles in the inner solar system. Some of that dust comes from material ejected from comet nuclei as the Sun heat sublimates cometary ices. The rest of it derives from the hundreds of thousands of asteroids that inhabit the solar system between the orbits of Mars and Jupiter. Collisions among these rocky objects grind down their surfaces and release lots of fine dust. Most of the particles have diameters from a few micrometers up to a millimeter. The particles remain close to the ecliptic and spiral slowly toward the Sun, where their density and brightness are highest. They glow by reflecting sunlight, a fact the ancient Egyptians surely would have appreciated.

**Pillar of light**

The obelisk’s shape also has solar significance. The obelisk represents Egypt’s earliest symbolic art and architecture. According to Egyptian mythology, obelisks came in pairs: two in the celestial realm and two on Earth. They were identified as the first manifestation of the primeval god Amun and were thought to correspond to rays of the rising Sun. Traditionally, they were positioned to reflect sunrise and sunset.

Another light show sometimes seen near sunrise or sunset closely matches the obelisk’s shape. A Sun pillar is a vertical shaft of light that either rises above or falls below the Sun’s position. It usually ends in a point. Occasionally, a pillar will appear both above and below the Sun simultaneously.

Sun pillars arise from sunlight reflecting off the surfaces of six-sided, plate-like ice crystals that make up thin, high-level clouds in Earth’s atmosphere. Although they require ice crystals to form, the pillars aren’t confined to cold-weather climates. They can appear anywhere around the world because temperatures remain low at the cloud’s high altitude.

The Sun played a huge role in how the ancient Egyptians viewed the world and their position in it. The sun-god Re was born each morning when he broke through the eastern horizon. He then traversed the sky to near the zenith, descending to the western horizon. When each day came to end, Re died at dusk, only to be resurrected again when morning twilight returned. It’s a story 5,000 years old, but one keeping researchers engaged at the dawn of the 21st century.

**WORDS OF EGYPT**

AHKET — Egyptian for “horizon”, the place where the Sun was reborn each day.

BENBEN — sacred stone with a cone shape; also, a pyramid’s capstone or obelisk’s tip.

GIZA — site in Lower Egypt; home of the great pyramids.

HELIOPOLIS — site in Lower Egypt; center of the solar cult.

LIGHTLAND — luminous hill of light associated with twilight.

RE — Egyptian sun-god.

SUN PILLAR — vertical shaft of sunlight visible near sunrise or sunset.

ZODIACAL LIGHT — softly glowing pyramid of white light visible before dawn and after dusk.

The stars played a huge role in the lives of the ancient Egyptians. Here, a man rides a boat on the Wadi Hamamat (a normally dry riverbed), guided by a bright star, **Toussid**

**WHAT WAS EGYPTIAN ASTRONOMY LIKE?**

**CREPUSCULAR RAYS** have also been seen as a possible celestial inspiration for the great pyramids. (6th-millennium BCE)

**THE STARS** played a huge role in the lives of the ancient Egyptians. Here, a man rides a boat on the Wadi Hamamat (a normally dry riverbed), guided by a bright star, **Toussid**

**WHITE LIMESTONE once covered the pyramids, so they gleamed in sunlight.** (Illustration by Fred Holtz)

**THE ZODIACAL LIGHT shows a distinct pyramidal shape when seen against a pitch-black sky — conditions that would have been common in the desert air of ancient Egypt.** (6th-millennium BCE)