

FYI

Stonehenge, the Temple of Kukulcán, and Chaco Canyon

Many ancient cultures had detailed and accurate means of tracking the motions of astronomical objects such as the sun. These cultures often used such motions to help them track time and mark important events.



Figure 2-11: Stonehenge as it exists today

One of the most famous ancient astronomical “observatories” is Stonehenge ($51^{\circ} 11' N$; $1^{\circ} 50' W$), a structure of huge stone pillars and slabs in what is now England. The various pillars and holes of Stonehenge appear to line up with the rising and setting times of the sun and the moon on important days in the ancient British calendar. For example, the best-known alignment is from the center of Stonehenge’s circle. From there, one has a clear sight line through an opening in the outer ditch of Stonehenge and over a massive stone located outside the main structure. This line of sight points directly toward where the sun rises on the northern hemisphere’s summer solstice—the day when the sun is at its most northern position. How many and which of the alignments were intentional is unknown.

Another ancient astronomical site is the Temple of Kukulcán ($20^{\circ} 40' N$, $88^{\circ} 32' W$) at Chichén Itzá in what is now Mexico. In the hour before sunset on both of the equinoxes, an unusual and remarkable pattern of light and shadow plays along the pyramid’s staircase. The large stepping structure of the edge of the pyramid casts a series of shadows, one step at a time from the top to the bottom, that looks like the markings of a diamondback rattlesnake. The placement of carved snake heads at the bottom of the stairway in exactly the correct position supports the idea that this display is deliberate. It is hypothesized that the appearance of this snake probably related to some ceremony held on the evenings of the equinoxes.



Figure 2-12: The Temple of Kukulcán

Chaco Canyon ($36^{\circ} 03' N$, $107^{\circ} 59' W$), in what is now New Mexico, contains a very simple but powerful astronomical calendar. Believed to have been made by the Anasazi, ancient Native Americans of the Southwest, the calendar consists simply of three rock slabs and a cave painting of spirals. It marks the solstices and equinoxes, and generally indicates the time between these special days. Sunlight passes through slits between the three slabs and creates pointed bands of light that move relative to the spirals painted there. For example, one of the bands of light passes directly down through the center of the primary spiral on the northern hemisphere's summer solstice, and the point of that band is at the spiral's center when the sun is at its highest point in the sky. Six months later, on the northern hemisphere's winter solstice, two bands of light exactly frame the spiral, just touching its outer edges.



Checking In

1. What times of day were important at Stonehenge, the Temple of Kukulcán, and Chaco Canyon?
2. What times of year were important at each of the three locations?

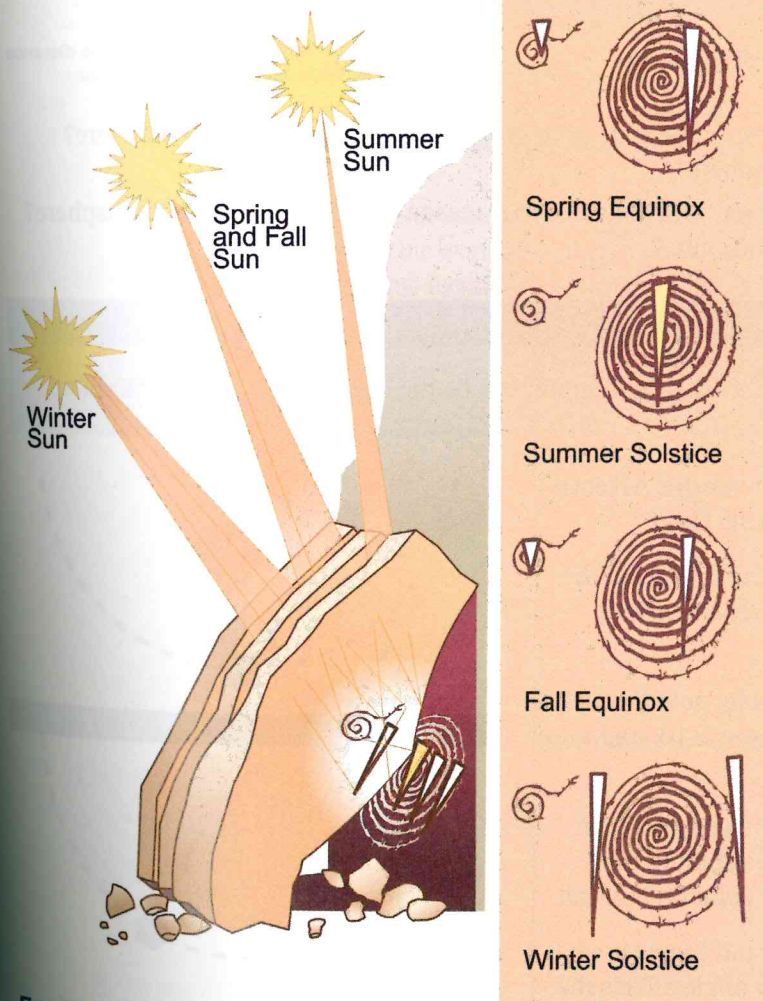


Figure 2-13: Diagram showing how sunlight falls on the spirals in Chaco Canyon

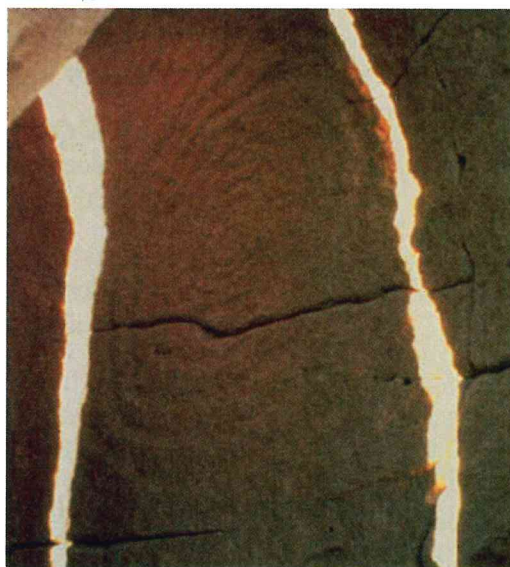
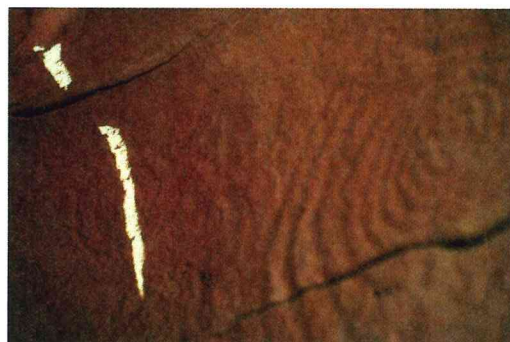


Figure 2-14: Photographs of the Chaco Canyon spiral on (a) the summer solstice, (b) fall equinox, and (c) the winter solstice