By Stefan Constantinescu, Science Editor

Debunked Myths About How the Egyptian Pyramids Were Built

E.T. was not involved

There is nothing more defining for the Egyptian civilization than the royal tombs called **pyramids**. Donald Redford, professor of Classics and ancient Mediterranean studies at Penn State has attempted, on Physorg.com, to explain how the ancient Egyptians built the pyramids, based on their solar religion. The Egyptian sun god **Ra**, the supreme deity, was said to have emerged from a pyramid-shaped mound and the pyramid symbolizes the sun's rays."The Egyptians began using the pyramid form shortly after 2700 B.C., and the great heyday of constructing them for royalty extended for about a thousand years, until about 1700 B.C.," said Redford.The pyramid construction started with pharaoh Djoser during the Third Dynasty. His architect, Imhotep, revolutionized the building of the tombs by creating a step pyramid by gathering six mastabas, rectangular royal tombs.All kinds of imaginative (or not) theories emerged on time, from extraterrestrial beings having built the pyramids, to lost ancient Egyptian technologies. "But the process of building pyramids, while complicated, was not as colossal an undertaking as many of us believe," said Redford.It seems that the largest pyramid required 20,000 and 30,000 laborers, who ended it in less than 23 years. Many European monuments took much longer. Notre Dame Cathedral in Paris was completed in two centuries."Pharaohs traditionally began building their pyramids as soon as they took the throne. The pharaoh would first establish a committee composed of an overseer of construction, a chief engineer and an architect. The pyramids were usually placed on the western side of the Nile because the pharaoh's soul was meant to join with the sun disc during its descent before continuing with the sun in its eternal round. The two deciding factors when choosing a building site were its orientation to the western horizon where the sun set and the proximity to Memphis, the central city of ancient Egypt," said Redford.The transport of the material did not pose such a problem. "The cores of the pyramids were often composed of local limestone," said Redford.For capstone, a hard rock, like granite or basalt, was used. This was plated with **gold**, silver or electrum, an alloy of gold and silver, making the pyramids shiny."The image most people have of slaves being forced to build the pyramids against their will is incorrect. The concept of slavery is a very complicated problem in ancient Egypt, because the legal aspects of indentured servitude and slavery were very complicated. The peasants who worked on the pyramids were given tax breaks and were taken to 'pyramid cities' where they were given shelter, food and clothing," said Redford."Ancient Egyptian quarrying methods -- the processes for cutting and removing stone -- are still being studied. Scholars have found evidence that copper chisels were using for quarrying sandstone and limestone, for example, but harder stones such as granite and diorite would have required stronger materials," said Redford.Massive chunks of dolerite, a hard volcanic rock, were employed in the Aswan quarries to detach granite blocks, by pulverizing the stone around the edge of the blocks."60 to 70 men would pound out the stone," said Redford.At the bottom, they introduced wooden pegs into the cut slots, and when the pegs were removed, they detached the stone. Oxen or men dragged the stones on an oil lubricated slipway towards the boats waiting on the **Nile**."A scene from a 19th century B.C. tomb in Middle Egypt depicts an alabaster statue 20 ft (6.6 m) high pulled by 173 men on four ropes with a man lubricating the slipway as the pulling went on. Once the stones were at the construction site, ramps were built to get them into place on the pyramid," said Redford.The mud brick ramps had their surface hardened with plaster."If they consistently raised the ramp course by course as the teams dragged their blocks up, they could have gotten them into place fairly easily. At least one such ramp still exists. I usually show the skeptic a picture of 20 of my workers at an archaeological dig site pulling up a two-and-a-half ton granite block. I know it's possible because I was on the ropes too," said Redford.