



Unlocking the medical mysteries of King Tut's tomb

BY **DR. HOWARD MARKEL** November 4, 2016 at 2:00 PM EDT



The mask of King Tutankhamun at the Egyptian Museum in Cairo. Photo By Shadi Bushra/Reuters/File

On this day in 1922, the tomb of Tutankhamun, or King Tut as he is better known, was discovered by British archaeologist Howard Carter. The news grabbed the world by the scruff of its collective neck.

Most compelling was Tut's "eternal resting place," a tomb consisting of four chambers, each one guarded by a golden door. In 1939, The New York Times reported it filled with "couches, chairs, alabaster vases, chariots, a throne, stools and chests, all glistening with inlay and gold, and a sealed doorway leading still beyond. When the doorway was opened, a wall of gold was revealed — the side of an immense gilt shine shielding the

sarcophagus of the buried king."

Tutankhamun ruled ancient Egypt for a little more than a decade, from around 1333 B.C. (when he was only 9 years old) to about 1324 B.C., during the 18th dynasty (circa 1550-1295 B.C.) of ancient Egypt's New Kingdom (circa 1550-1070 B.C.). His brief reign, disabled left leg and foot, and premature death at 18 or 19 have long been sources of fascination.

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Upon hearing the news of Carter's discovery, the patron of the archaeological dig, George Herbert, the 5th Earl of Carnarvon, rushed to Egypt from Highclere Castle in Hampshire (the very same estate occupied by the fictional Crawley family in the British television drama "Downton Abbey") to join Carter in opening the tomb.

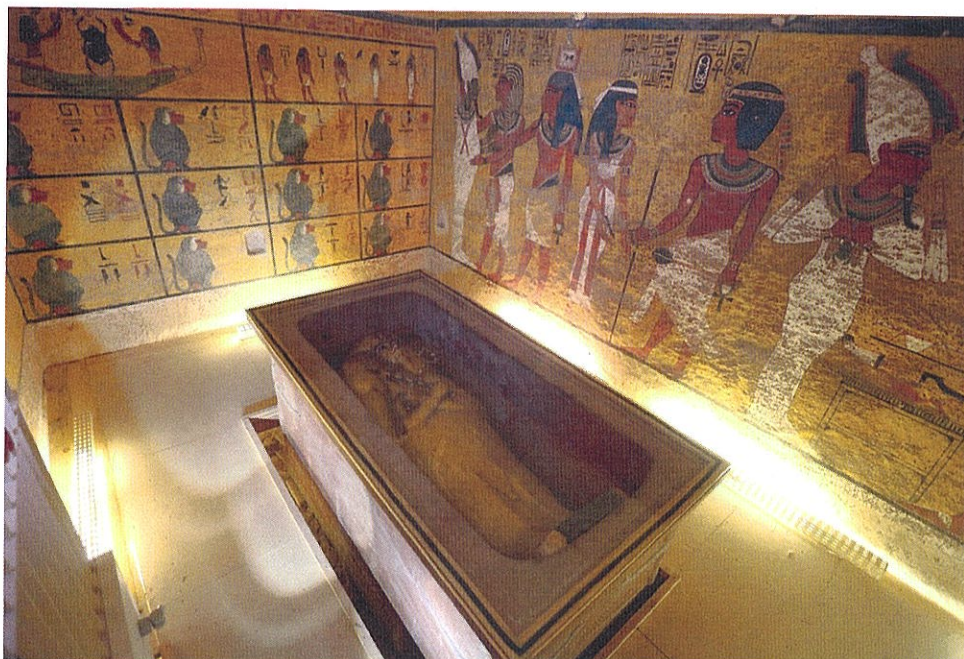
On April 5, 1923, Herbert died in his room at the Continental-Savoy Hotel in Cairo, most likely due to blood poisoning or sepsis after a mosquito bite that was subsequently injured and infected while shaving. It was said that at the time of the earl's death, Cairo suffered a power outage and that his beloved dog Susie, back home in England, howled her last and died. There was also the concurrent issue of Carter's pet canary being swallowed to death by a cobra. Amplifying the drama, creator of Sherlock Holmes and proponent of mysticism and the afterlife Sir Arthur Conan Doyle proclaimed the curse to be orchestrated by "elementals — not souls, not spirits — created by Tutankhamun's priests to guard the tomb."

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Many experts denied the existence of any such curse. One of the most prominent to do so was Herbert Winlock, a distinguished Egyptologist and director of the Metropolitan Museum of Art in New York City. He compiled a list of the people who played a role in the tomb's discovery and opening. On Jan. 26 1934, The New York Times interviewed Winlock about it. The six people present at the opening of the tomb who did die in the 12 years that had passed, Dr. Winlock insisted, were all easily explained by their long histories of poor health. Despite Winlock's measured objections, the curse rumors never really died.

In the late 1990s, some investigators suggested that the workers who took ill and died might have been exposed to toxic strains of *Aspergillus niger*, a fungus better known as "black mold."

But doctors and medical sleuths have been less interested in death curse rumors, and far more fascinated by King Tut's poor health. Over the years, there has been a veritable textbook of explanations for Tut's early demise, limping gait, and the androgynous appearance of his face and gynecomastia (enlargement of the breasts) portrayed in his gold-gilded death mask, sculptures, walking sticks and other relics.



In 1968, a series of X-rays were taken of Tutankhamun's mummy, which found evidence of trauma to the back of the head (later concluded to have occurred post-mortem during the mummification process) and an unhealed broken leg. These findings led some armchair pathologists to explain Tutankhamun's death as caused by falling from his chariot. Others claimed he was kicked in the head by a large beast. Or he might have died from either septicemia or a fat embolism secondary to the femur (thigh bone) fracture. And, most sensationally, that he was murdered by means of a blow to the back of his head as the climax to a web of foul play and palace intrigues worthy of a Shakespeare play.

The golden sarcophagus of King Tutankhamun in his burial chamber in Luxor, Egypt. Photo by Mohamed Abd El Ghany/Reuters

Between Sept. 2007 and Oct. 2009, Dr. Zahi Hawass of the Supreme Council of Antiquities in Egypt, along with colleagues from the Egyptian Museum's Ancient DNA laboratory and the Institute of Human Genetics at the University of Tübingen, independently examined 11 royal mummies believed to be from King

Tutankhamun's immediate lineage (circa 1410-1324 B.C.) and another five royal mummies from an earlier period (circa 1550-1479 B.C.).

Their objective, which they published in the Feb. 7, 2010, issue of the *Journal of the AMA*, was "to introduce a new approach to molecular and medical Egyptology, to determine familial relationships among 11 royal family mummies of the New Kingdom, and to search for pathological features attributable to possible murder, consanguinity, inherited disorders and infectious diseases." Unlike the many papers previously published about King Tutankhamun's death and medical history, this study was "based on unfettered access to the actual mummies."

Applying several new genetic techniques, Hawass and his team elucidated a plausible five-generation pedigree, establishing Yuya and Thuya as the great-grandparents of Tutankhamun; Pharaoh Amenhotep III and KV35 elder lady (Queen Tiye) as his grandparents; and KV55 male (most likely Akhenaten) and KV35 (a young female), who are siblings, are also Tutankhamun's parents. (Marriages within the royal family were quite common in Ancient Egypt).

The scientific team was unable to address the issue of Tutankhamun's supposed androgyny and gynecomastia, however, because his chest

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wall is missing and the pathological and x-ray examinations failed to deliver any evidence of a feminine physique. The “beautified” death mask, artifacts and portraits of Tutankhamun were, most likely, a style of expression in Ancient Egypt rather than a statement about gender.

There was no genetic evidence of disorders such as Marfan or Antley-Bixler syndromes. Tutankhamun’s mummy did, however, reveal “juvenile aseptic bone necrosis of the left second and third metatarsals, which may be consistent with Köhler disease II or Freiberg-Köhler syndrome,” both rare bone disorders in which the key bones in the foot die off and collapse.

Although there was no evidence of bubonic plague, tuberculosis, leprosy or leishmaniasis, the scientific team did find DNA evidence of *Plasmodium falciparum*, a parasite that causes malaria, in many of the royal mummies, including Tutankhamun. These mummies represent some of the earliest examples of malaria in the ancient world.

Hawass and his colleagues concluded that Tutankhamun might have suffered from a number of inherited disorders of consanguinity (i.e. being descended from couples who are blood relations), which weakened his immune system and overall health. They found no evidence of foul play and, instead, hypothesized a sudden fracture of the leg (such as one incurred by a fall), which only worsened because of his malarial infection.

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Circling back to the curse against those who disturbed King Tut’s tomb, the best evidence against such supernatural musings was the life and death of Howard Carter. Carter lived for another 17 years, before dying at age 66 in 1939, most likely of a heart attack after a long battle with Hodgkin’s lymphoma. Again, we rely on The New York Times, which closed the case in its obituary of Howard Carter as “the best refutation of the curse”: “Afflicted with bad health from his youth, [Carter] spent nearly fifty years in Egypt searching for and exploring the ruins of the tombs of Pharaohs and must have been subject to the finest collection of Egyptian curses.”



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