CHAPTER 9

A Major Delay in Construction

1. How many years did the construction of Khufu's pyramid actually take?

In my view, no definitive evidence establishes the length of time required to complete Khufu's pyramid.

Pierre Tallet, drawing on the Diary of Merer discovered by his team in 2013, argues for Year 27 of Khufu's reign by applying the biennial cattle-count hypothesis.

However, the biennial hypothesis itself is not an established academic consensus.

For example, Zahi Hawass rejects the biennial system and instead proposes Year 17, based on numbers found in the relieving chambers above the King's Chamber.

Yet Hawass's argument is also problematic. According to Howard Vyse's records, other blocks bearing different numbers were found in the relieving chambers, making it untenable to assert that these numbers represent regnal years. Moreover, Hawass's article includes a photograph of a hieratic inscription showing a date, but this is actually a citation from Lepsius's Denkmäler aus Aegypten und Aethiopien, and the readable date comes from Dahshur, not Giza. In the end, Hawass does not present an inscription that explicitly states "Year 17 of Khufu." Thus, his Year 17 proposal lacks the evidentiary foundation necessary to be considered decisive—although it is noteworthy that Hawass does not adopt Tallet's biennial hypothesis.

The only relatively reliable datum is Year 14, derived from reading

Merer's diary without applying the biennial hypothesis. Even then, Merer's involvement in transporting casing stones from Tura is Tallet's interpretation; the diary itself does not explicitly state this. Therefore, even the assertion that "casing stones were being transported in Year 14" should be treated with caution.

Since the two proposals hinge on opposite assumptions about the biennial hypothesis, they cannot both be correct—an inherent contradiction.

However, both interpretations contain serious implications for the construction timeline. Tallet's proposal implies that even in Year 27, casing stones were still being transported and the masonry work was ongoing. Hawass's proposal, on the other hand, suggests that the relieving chambers—located at less than half the pyramid's final height—were completed only by Year 17, making it difficult to imagine that the entire pyramid could have been finished within a 20-year period.

It is unclear whether Hawass or Tallet recognize that their interpretations naturally raise the question: Was Khufu's pyramid truly completed before the king's death? Yet neither interpretation appears to be dismissed as "out of the question" within Egyptology, which I find intriguing. Herodotus, in Histories Book II, states that the paved causeway took ten years and the pyramid itself twenty years to build. Egyptologists may privately suspect that even twenty years would have been insufficient.

The average lifespan in ancient Egypt was low due to high infant and child mortality, and even adults often died in their forties or fifties. Adult life expectancy may have been around twenty to thirty years. Within such constraints, the construction of a royal pyramid—required to be completed before the king's death—must have been planned with a realistic timeframe. I consider a target of roughly ten years, with delays extending into the low teens being acceptable. If project members had initially proposed "twenty-five years," the king would likely not have approved the undertaking.

Given the experience gained from building the Bent Pyramid and the

Red Pyramid, setting a target of ten to fifteen years seems reasonable. Conversely, if the target was around ten years, both Tallet's and Hawass's interpretations imply that the actual construction period exceeded the target by more than double.

In any project, the construction period is one of the most fundamental specifications. The schedule is built around it, and the required workforce is estimated accordingly. For pyramid construction, this included quarrying, transport, hauling, masonry, supervisors, food procurement, provisioning, and medical care. Although ancient Egypt did not operate under a monetary economy, the construction period would still have been a basic management parameter. A delay of more than double the target period would hardly constitute a successful project; completion alone would not be the sole criterion of evaluation.

As for the causes of delay, the most obvious is the fear of vertical load (ground pressure), which led to numerous countermeasures. These included the construction of the unused subterranean chamber and the Queen's Chamber. The many mysterious voids detected today likely reflect on-site troubleshooting, rework, and trial-and-error, all of which would have contributed to delays. In short, the combination of heavy, conservative safety design and insufficiently completed architectural planning likely resulted in a major extension of the construction period.

2. Was Khufu's pyramid truly completed?

The complete absence of burial traces in the King's Chamber raises the question of whether Khufu's pyramid was actually completed before the king's death.

It is uncertain whether this question has simply never been seriously considered, or whether scholars have noticed it but refrained from stating it publicly.

No evidence of completion—such as the stela found at the Bent Pyramid's eastern chapel—has been discovered for Khufu's pyramid. Among the monuments associated with Khufu at Giza, the only structure

with clear evidence of completion and sealing is the solar boat, which bears the name of Djedefre. The fact that this single piece of evidence is repeatedly cited in various publications underscores how scarce the relevant data are.

Sneferu is said to have built three large pyramids within twenty-four years. From that perspective, setting a target construction period of ten to fifteen years for Khufu's pyramid would not have been unreasonable. Yet in practice, the construction conditions differed greatly. First, the efficiencies gained from continuous production during Sneferu's reign could not be replicated at Giza. New infrastructure—such as access routes and Khufu's harbor—would have been required. Geological surveys would also have been necessary before selecting the site.

Second, the production system that had been operating continuously from the Bent Pyramid to the Red Pyramid would have wound down after the completion of the latter. Restarting quarrying operations at a new location would have required preparation time. The production and stockpiling of mudbricks would also have been essential. Although Herodotus's claim of ten years for road construction seems excessive, it is plausible that three years passed before masonry work began.

A distinctive feature of Khufu's core masonry is that many blocks appear to have been trimmed on the front face but not fully dressed on all six sides. As discussed in Chapter 2, quarrying by fracture—using powerful impact forces—could have maintained production throughput, but trimming would have required substantial labor. Since horizontal layering became standard after the Red Pyramid, the upper and lower faces of blocks were typically dressed, but dressing all six faces would triple the labor. This pursuit of precision seems to reflect Khufu's emphasis on safety, but it must have significantly affected the construction period.

My suspicion that the pyramid was left unfinished arises from the condition of its summit. I am aware of theories suggesting collapse or the removal of a massive pyramidion in later periods, but photographs raise doubts: if collapse had occurred, would the four sides of the topmost

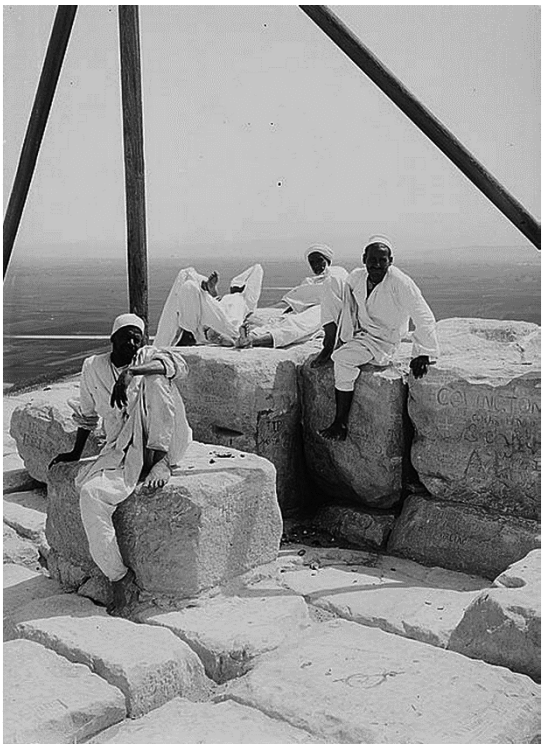


Fig. 9-1. Egyptian views; The pyramids of Gizeh. Summit of the Great Pyramid. (G. Eric and Edith Matson Photograph Collection. American Colony (Jerusalem) Photo Department, ca. 1900–1920.)

completed course really remain as neatly preserved as they are today?

Above the highest finished course, there are partially assembled sections and abandoned blocks.

For more than a century—until its removal sometime between 2019 and 2021—a metal survey tower stood atop the pyramid. The U.S. Library of Congress holds photographs from around 1900–1920 showing the tower's supports. I once suspected that the flatness of the summit resulted from clearing debris during the tower's construction. However, 19th-century illustrations predating the tower show a condition similar to that in Fig. 9-1, suggesting that the current appearance is original rather than the result of modern alteration.

Particularly noteworthy is the state of the masonry where people are seated in Fig. 9-1. If the summit were perfectly flat, the hypothesis of a massive pyramidion might merit consideration. But in the present condition, the course on which people sit (the 204th course) would have had to be completed before any pyramidion could be installed.

The collapse hypothesis is also highly implausible. The stones on which people are sitting or reclining in the photographs are located on the outer edge of the summit. It is extremely difficult to imagine a scenario in which only the stones on the near side would have disappeared as a result of collapse, while the outer stones remained intact.

Furthermore, even if later stone-seekers had removed blocks from the pyramid, there would have been far easier sources of stone near ground level. From a practical standpoint, it would be extraordinarily irrational for them to remove only the core blocks from the summit—the most difficult location from which to extract and transport material.

Thus, rather than interpreting the present condition of the pyramid's summit as the result of natural collapse or deliberate destruction, it seems far less contrived to regard it as the state in which construction was halted for some reason and subsequently left untouched.

If the masonry itself had not yet been completed, then the hypothesis of an unfinished pyramid would be entirely reasonable. Even if the masonry had been completed, however, whether that stage alone constituted "completion" remains open to debate.

For example, the pyramid of Menkaure is clearly complete in terms of masonry, yet it is regarded as unfinished because the outer faces of the lowest granite casing blocks remain unpolished. This demonstrates that, within the field of archaeology, "completion" is not necessarily defined by the mere finishing of the stonework.

Fig. 9-2 illustrates the basic stages of pyramid construction. In the strict sense, true completion should correspond to Stage F, when the polishing of the casing stones and the removal of the ramps have both been finished.

In modern building projects as well, "completion" does not refer to the moment when the exterior structure is finished. A building is considered

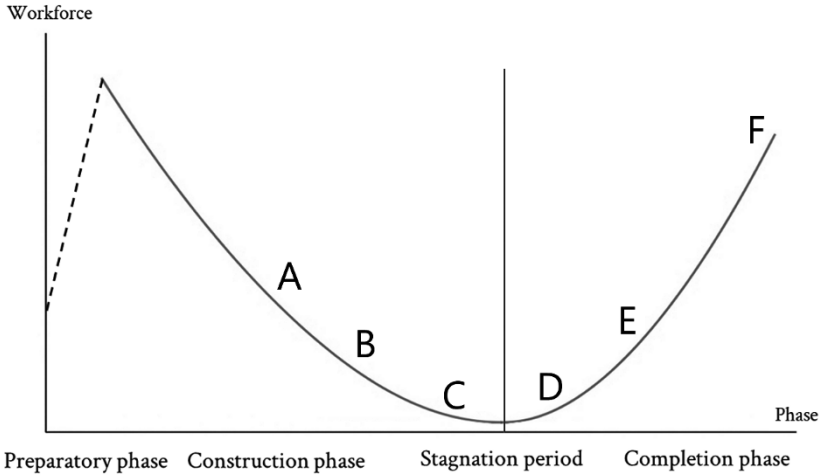


Fig. 9-2. The construction process of the pyramid and considerations regarding the timing of King Khufu's death.

complete only when interior work and auxiliary installations—such as electrical and water systems—are finished and the structure is formally handed over to the client. Although large commercial facilities sometimes open certain sections before overall completion, such "pre-openings" occur only after the client has approved partial handover; the construction company cannot unilaterally declare completion.

In Fig. 9-2, the vertical line between Stages C and D indicates the completion of masonry. However, even if the stonework had been finished at that point, the pyramid would still have been entirely covered by mudbrick scaffolding and the encircling spiral ramp. In this state, the pyramid would have appeared as a massive mound of mudbrick rather than a finished monument.

Once completed, the pyramid and its associated mortuary temple would have functioned as sacred facilities. Thus, the effective "handover" would have been to the priesthood, likely through a religious ceremony. From this perspective, it is doubtful that the pyramid in Stages D or E—still encased in mudbrick—could have been regarded as a completed sacred monument ready for ritual use.

Before I obtained and read the Diary of Merer myself, I had initially accepted Tallet's interpretation that casing stones were being transported in Year 27. Even then, I found it difficult to imagine that Khufu was still alive at Stage C, when casing stones were still being moved, and that he survived long enough to witness Stage F. I therefore suspected that Khufu's death occurred during Stage D or E. Since the king's burial required the handover of the pyramid and mortuary temple to the priesthood, I questioned whether the structure could have functioned as a funerary complex in the condition represented by Stages D or E. I also considered the possibility that only the two solar boats had actually been completed and ritually consecrated, which would explain why they bear the name of Djedefre and why they survived later destruction or reuse—they were functioning religious installations.

However, after reading the Diary of Merer myself, I found that much of Tallet's interpretation rests on assumptions rather than firm evidence. In particular, the identification of the site as Tura and the assumption that Merer was transporting stone blocks seem weakly supported. Moreover, Tallet's argument presupposes the biennial cattle-count system, yet this system was not definitively established even in William S. Smith's Inscriptional Evidence for the History of the Fourth Dynasty (1952), and scholars such as Zahi Hawass explicitly reject it. Thus, the claim that casing stones were being transported in Year 27 cannot be regarded as securely proven.

Tallet argues that if Year 27 corresponded to Stages A or B, completion would have been impossible, and therefore he places Merer's diary in Stage C, even calling it "the very end of Khufu's reign." Yet if Stage C represents Khufu's final years, it is implausible that he lived long enough to reach Stage F. It is possible that Tallet simply equates the completion of masonry with overall completion.

If we set aside Tallet's assumption that Merer was transporting casing stones, and instead consider that he may have been transporting other goods—supplies, food, or personnel—and if we read the diary as Year 14 rather than Year 27, then Merer's deliveries to the harbor at Giza could

correspond to any stage from A through E. If Stage E corresponds to Year 14, then Stage F occurring around Year 20 would not be unusual. Thus, the interpretive framework I initially adopted—based on Tallet's reading—loses its foundation.

In its place, however, the present condition of the pyramid's summit offers a compelling alternative explanation: if Khufu died during Stage C and construction was abandoned at that point, many of the puzzling features of the summit are naturally accounted for.

The discussions in the following chapters are written with the possibility in mind that Khufu's pyramid remained unfinished. Without this premise, the interpretations that follow would not hold. The purpose is to demonstrate the explanatory power of the unfinished-pyramid hypothesis.

Column 5. Reflections on Royal Names Preserved on Stone

Fig. C5-1 reproduces the inscriptions found on stone blocks from the pyramids of Giza and Dahshur as published in Lepsius's work. Because the original layout is highly irregular, I have prepared Fig. C5-2, in which the signs are resized for comparison. Signs a–e are from Giza, while f and g are from Dahshur.

Among these, a and b represent the standard orthography of King Khufu's name: . Sign c is less commonly attested, and sign d is not immediately recognizable as any known royal name. However, from the perspective of someone accustomed to writing logographic characters, the right-hand element of d appears to be an attempt to imitate the jar sign seen in c. The quadruped on the left, however, is difficult to identify.

Turning to Lepsius's sign C5-2-e, careful inspection reveals that the figure is printed upside down—an editorial error. When rotated 180 degrees (C5-2-e2), it becomes clear that this sign also represents the same sequence. Within this panel, two legible details can be extracted: e3, a cartouche accompanied by the same group of signs seen in c, and e4, a cartouche alone.

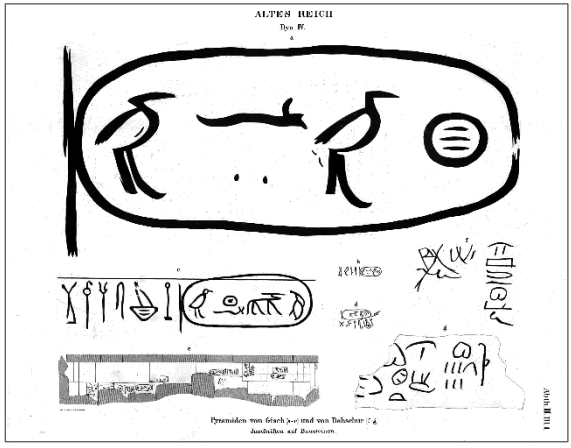
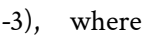
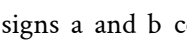


Fig. C5-1. Various royal name inscriptions as published in Karl Richard Lepsius, Denkmäler aus Aegypten und Aethiopien, 1849–1859, Abteilung II, Blatt 1 (Public Domain Mark 1.0, via Internet Archive).

Consulting the website PHARAOH.SE, which compiles numerous variants of royal names, I found that Khufu's name is also written as . The signs represent the god Khnum, associated with water and the Nile; the name thus means "Khnum protects me."

Lepsius also includes a relief from Wadi Maghara in the Sinai Peninsula (C5-3), where the sequence  appears. Consequently, signs a and b correspond to ; signs c and e3 correspond to ; sign e4 represents , lacking and ; and sign d contains only . In other words, all signs a–e represent variants of Khufu's name.

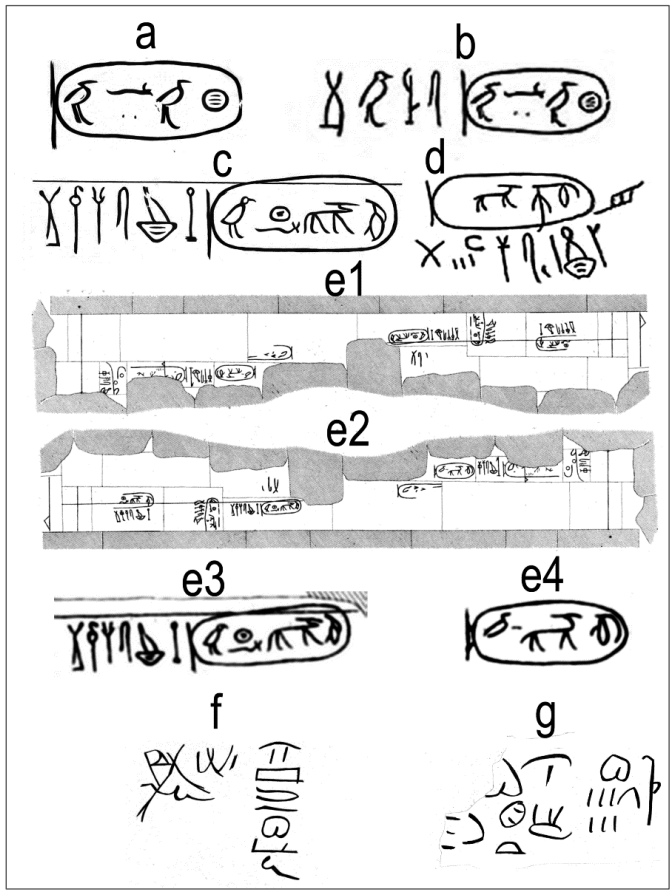


Fig. C5-2. Rearranged and rescaled version of Fig. C5-1 for improved legibility.

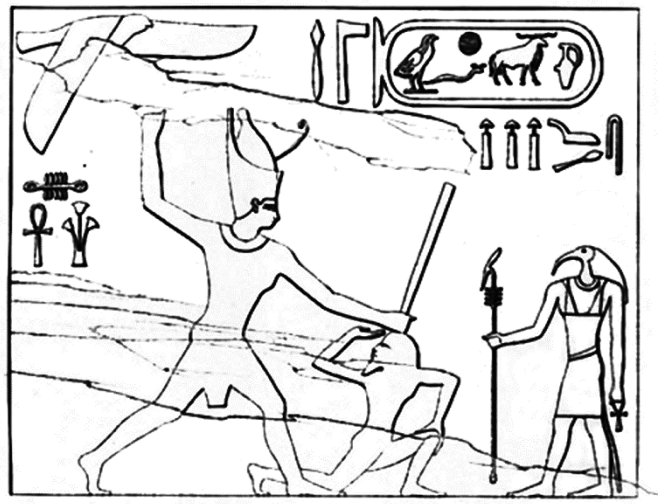
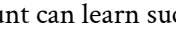


Fig. C5-3. Relief discovered at Wadi Maghara, as published in Lepsius, Denkmäler aus Aegypten und Aethiopien, 1849–1859, Abteilung II, Blatt 2.

In logographic writing systems, it is possible to imitate the shape of characters without understanding their meaning. In Japan, for example, kindergarten-aged children often attempt to copy kanji by sight, even though they cannot read them. Although literacy in ancient Egypt is often estimated at around one percent, I believe that numeracy was far more widespread—perhaps ten percent of the population could read and write numbers. After all,  simply represents "368"; anyone who can count can learn such numerals.

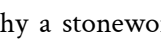
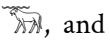
If you now look at sign C5-2-g, you will immediately recognize that the numerals 16 and 13 are clearly written there.

The inscriptions on the pyramid stones include work-gang names and what appear to be placement numbers. Among those who wrote these marks, some were literate and capable of writing signs correctly—such as the scribes responsible for a, b, and c—while others merely copied the shapes. Those who copied the signs may not have understood hieroglyphs or been able to read them aloud, but they could still imitate the drawings.

長瀬　博之

Nagase　Hiroyuki

To illustrate this, I would like readers to try copying my own name—Nagase Hiroyuki (長瀬博之)—five times by sight. For the first attempt, please try writing the full 長瀬博之. If this proves too difficult, you may write only 博之 for the remaining attempts; even I find the character 瀬 cumbersome to write in daily life.

After completing five attempts, you will likely find that no two copies are identical. The fifth 博之 you wrote is probably far closer to the original than the first attempt. At this point, you may also understand why a stoneworker might have wished to abbreviate  to , and why omissions such as that seen in e4 occur. Copying a drawing is not the same as writing a character.

It is therefore plausible that the Dahshur inscriptions f and g were not written as hieroglyphs but drawn as pictures. Their irregular arrangement and the completely unidentifiable sign on the left side of f suggest that the writer did not understand the script itself.