Egyptology at the Dawn of the Twenty-first Century

Proceedings of the Eighth International Congress of Egyptologists Cairo, 2000

> Volume 1 Archaeology With a preface by Zahi Hawass

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> Volume 1 Archaeology

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Edited by Zahi Hawass

In collaboration with Lyla Pinch Brock

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Preface

Zahi Hawass

The Eighth International Congress of Egyptologists, held in Cairo in March 2000, marked the opening of the new millennium as an opportunity to evaluate and redefine the focus and goals of Egyptology in the twenty-first century. Through the Millennium Debates and the papers of other participants published here, we are made aware that now more than ever, Egyptology is facing a period of change and challenge and we must meet these challenges if our field is to remain relevant to the modern world. The Congress was attended by some 1,400 scholars, and of the 400 papers delivered, 248 were selected by our scientific review committee to be published in these volumes. It is notable that this Congress included a higher number of Egyptian Egyptologists than we have seen in many years. In fact, some 500 Egyptian Egyptology is an indication of one of the frequently mentioned themes in the Congress: the need for education and training of more Egyptian scholars and excavators to study and maintain their country's monuments as part of the world's heritage.

The enormous quantity of submissions to the Proceedings led to the decision to publish them in three volumes. Volume One contains all the archaeology papers; Volume Two, those dealing with history and religion; and Volume Three covers the topics of language, literature, museology, and conservation. Each volume of these Proceedings opens with the text of the corresponding Millennium Debates and their respondents, and the papers of the specific subjects follow in alphabetical order by the contributor's name.

The Millennium Debates formed a special focus for this Congress. Chaired and responded to by eminent experts in the field, the Debates covered archaeology, art, history, language, literature, museology, religion, site management, and conservation. In his paper (opening the Debates in Volume One) on "Egyptology in the Twenty-first Century," David O'Connor provides a cogent summary of the trends in field work in Egyptology in the last forty years and discusses three points crucial to the future of Egyptian archaeology: the changing attitudes of Egyptians toward their archaeology, the need for comprehensive mapping (rather than excavation) of the national archaeological landscape, and theoretical issues and their impact on archaeology, epigraphy, and other scholarly disciplines.

Volume Two continues with keynote speakers addressing the Millennium Debate issues of history, art history, and religion. In his paper, "Writing the History of Ancient Egypt," Donald B. Redford challenges the appropriateness of new approaches to historiography such as retrospective economic theory, Egyptology as anthropology, deconstruction, and 'history from below,' as he characterizes the tendency to use anecdotal evidence to draw far-reaching conclusions about the 'common people' in Egyptian history. Edna R. Russmann, in her contribution to the Millennium Debate on the study of the art of ancient Egypt laments the failure of Egyptian art scholarship to coalesce into a recognized subdiscipline with an academic tradition of acknowledged interests and methods of its own. She goes on to give a summary of the most urgent needs facing the study of Egyptian art as well as possible solutions. In the last Millennium Debate paper in Volume Two, Herman te Velde writes on "The History of the Study of Ancient Egyptian Religion and its Future," which he considers one of the most urgent topics in Egyptology today, since the core of ancient Egyptian culture is its religion. He speculates that although Egyptologists with various special interests will contribute to the study of religion, the most progress should be expected from those willing to focus their research specifically on religion and its accompanying issues, such as polytheism versus monotheism, pharaonism versus local religions, and religion in life as well as death.

Perhaps the most challenging of Millennium Debate papers come in Volume Three. John Baines' comprehensive examination of the current and future possibilities for research on Egyptian literature is complemented by Antonio Loprieno's notes on the problems and priorities in Egyptian linguistics. Baines provides extensive analysis and definition of the Egyptian literary corpus, its relation to the wider stream of tradition and range of written forms, and the social and ideological situation and status of what was written. Loprieno concentrates on the achievements of Egyptian linguistics over the last fifteen years and considers the impact of recent developments in linguistic research on Egyptian phonology and lexicography. Regine Schulz's paper, "Museums and Marketing: A Contradiction" is a timely examination of the pressures facing museums around the world to provide "blockbuster entertainment" while maintaining their five basic mandates of collecting, preservation, research, presentation, and mediation. Finally, my own contribution to the Millennium Debates, "Site Management and Conservation," addresses some of the principal problems and threats to the conservation of Egyptian heritage sites and makes recommendations, some perhaps controversial, for improving site management methods and protection as well as giving suggestions for salvage and excavation over the next ten years.

In addition to being a forum for debate and report, the Congress honored several prominent Egyptologists for their outstanding contributions to the field, including Abdel-Aziz Saleh and Sayed Tawfik from Egypt; Harry Smith of England; William K. Simpson from the United States; Rainer Stadelmann from Germany; Jean Leclant of France; Sergio Donadoni from Italy; Kazimierz Michalowski of Poland; and the late Gamal Mokhtar, former Chairman of the Antiquities Organization of Egypt and Member of the Supreme Council of Culture.

I took great pride in the many complimentary comments I received regarding the organization and success of the Eighth International Congress of Egyptologists, but credit for this must be shared with the many people whose efforts made that success possible. I would like to thank the members of the different committees who planned and executed the many aspects involved in holding such a large conference. The Congress was held at the Mena House Oberoi Hotel in the shadow of the Giza Pyramids and thanks to its General Manager, Rajiv Kaul, everything ran smoothly in the day-to-day operations. The Congress would also not have been possible without the financial support of many Egyptian business corporations. Another important contributor was the American University in Cairo Press. Its director, Mark Linz, and the Press's editorial staff were of great help in completing the Congress's mission by publishing the Abstracts, edited by Angela Jones, and of course these final three volumes of Proceedings edited in collaboration with Lyla Brock.

In conclusion, I would urge the International Association of Egyptologists to review and expand its activities in the future, with the aim of making itself better known to the general public and potential sponsors. This would enable it to raise the funds to undertake and complete valuable projects, many of which are discussed in these volumes. I would also urge that scientific studies and research programs should be geared less to the personal interests of the researcher, but should follow an overall action plan targeting those areas where monuments are especially endangered, such as the Delta and the great deserts of Egypt. I believe that all who participated in the Eighth International Congress of Egyptologists and all those who read these volumes of Proceedings will take wise and positive action in regard to these concerns.

An Alternative Strategy for the Transportation of Quarried Hard Stone from Lower Nubia to Giza during the Old Kingdom¹

Elizabeth Bloxam

The Institute of Archaeology, University College London



"Chephren's Quarry" in the Western Desert of Egypt, 65 km northwest of Abu Simbel in Lower Nubia (fig. 1), was the source of blue iridescent banded gabbro-gneiss of which the Fourth Dynasty seated statue of Khafra is an example. The Egyptian state-run monopoly of exotic raw material acquisition and transportation from remote locations formed a major component of economic and ideological practices during the Old Kingdom.

Stone-built ramp structures dating to the Old Kingdom (2686–2181 BCE) are unique features of the quarry site, rising to approximately 1.5 m at their face. The first systematic excavation of the loading ramps and settlement at Chephren's Quarry was conducted in April 1999 by the Institute of Archaeology, University College, London, under the directorship

Fig. 1: Pharaonic quarrying and mining sites in Egypt and Nubia (after Shaw 1999).

of Ian Shaw. Archaeological evidence from the excavation suggests that alternative strategies for the transportation of stone to Lower Egypt were used to overcome the geographical, geomorphologic, and environmental difficulties that the site presents.

Interpretation of the fresh archaeological evidence and a comparative analysis of other contemporary quarry sites suggests the *kelek* or buoyed raft was an alternative method to transport stone from the quarry. This concept incorporates the utilization of the depression of the Wadi Tushka as a closer source of water to the quarry than the Nile to minimize haulage overland.

There have been many attempts to reconstruct how heavy weights of quarried stone were transported over long distances in antiquity. Some well-known examples include the bluestones of Stonehenge transported from West Wales to Wiltshire in south-west England, the Moai of Easter Island, and the obelisks from Aswan. These examples cover a time span of over 3,000 years. Common to all of them is the fact that the archaeological record has provided no evidence to reconstruct the practice. Experimental archaeologists have tried to do this with varying degrees of success. Most have concluded that a sledge on rollers in conjunction with some kind of prepared track seemed the most feasible explanation of how the stone was transported from its source.

Engelbach and Murray² were the first archaeologists to visit Chephren's Quarry in Lower Nubia in the 1930s. Their reports highlighted the enigmatic nature of two stone-built loading ramps located in the south of the quarry close to the Khufu Stele platform. They partly excavated one of the ramps and discovered two deep parallel tracks emanating from the ramp's face. The depth of the tracks and the extreme height of the ramps were features which perplexed Engelbach and Murray. This was because the evidence suggested that a vehicle other than a simple sledge must have been employed to remove the stone from the quarry.

Sixty years later, in April of 1999, a team of archaeologists from the Institute of Archaeology at University College London, under the directorship of Ian Shaw, returned to Chephren's Quarry to commence a season of survey and excavation. The main objectives were to excavate the workmen's settlement at Quartz Ridge and as part of the author's PhD research, to excavate the two stone-built loading ramps found by Engelbach and Murray at "Khufu Stele Quarry" in the south.

The exposed loading ramps show an exterior of large chipped blocks of gabbro-gneiss with an interior of loose spoil fill. Loading Ramp 1 (LR1) is located where the quarry workings are completely obscured and possibly worked out. Loading Ramp 2 (LR2) is located two kilometers to the north-west within the still visible quarry workings at Khufu Stele Quarry. It seems probable that the logistical construction of the ramps within the quarry workings was the focal point for the collection and transportation of stone away from the quarry.

The 1999 excavation of the loading ramps involved the removal of up to half a meter of windblown sand to expose the face of each ramp down to the original ground surface. During removal of the aeolian sand, pottery shards dating to the Old Kingdom were revealed. No pottery dating to later periods was found in any part of Khufu Stele Quarry whereas in areas of the quarry to the north, the pottery shards indicated both Old and Middle Kingdom activity.

When the original ground surface was reached, two parallel tracks (figs. 2 and 3) approximately 75 cm wide by 33 cm deep were revealed. The dimensions of excavated LR1 at its face are:

width	4.70 m.
Height of actual stone exterior	1.22 m.
Height from base of tracks	1.63 m.
Angle of slope	10 degrees





Fig. 2: Parallel tracks leading from Loading Ramp 1 at "Khufu Stele Quarry," "Chephren's Quarry." (photograph E. Bloxam, 1999).

Fig. 3: View of parallel tracks from Loading Ramp 2 "Khufu Stele Quarry," "Chephren's Quarry." (photograph: E. Bloxam, 1999).

The dimensions of excavated LR2 at its face are:

Width	5.50 m.
Height of actual stone exterior	1.00 m.
Height from base of tracks	1.32 m.
Angle of slope of ramp	10 degrees.

Once excavation to the base of each track was completed, the surface of the parallel tracks appeared harder than the surrounding original ground surface. It should be noted that the Old Kingdom ground surface would not resemble the deflated ground surface seen today, with its considerable deposition of wind-blown sand. Analysis of soil samples taken from the base of the track at LR2 revealed an abundance of quartz and carbonate minerals in what was originally a *playa* mud or siltstone. On exposure and desiccation this produced a hard stable surface crust, or "duricrust." Moving loads across this surface would not have required the use of rollers.³

The size of vehicle that could be accommodated can be estimated from the width of the tracks which are around 70 cm. The distance between the tracks is about 1.7 m, while the height of the vehicle must have been that of the ramp, about 1.5 m. The width could not be greater than that of the ramp (5 m) but its length is more uncertain. However, since the deepest parts of the track lie within 5 m from the ramp, this may be an indication of length. Hence, the vehicle was approximately 5 m x 5 m x 1.5 m (l x w x h). It should be noted that each runner was quite wide (75 cm) distributing the weight over a large surface area and reducing the tendency to dig into the ground. If the width of the vehicle was a function of the distance between tracks (runners) then its size is reduced to 5 m x 1.7 m x 1.5 m (l x w x h).

An interesting and unexpected feature of the parallel tracks at both loading ramps, which Engelbach and Murray had previously overlooked, was that they had been artificially cut rather than worn by constant traffic, because there were no signs of abrasion along their sides. It seems feasible to suggest that the tracks were cut to accommodate the vehicle's runners and to bring the top of the vehicle or platform flush with the top of the ramp.

At both loading ramps the tracks disappear at approximately 9 m from the faces of the ramps further indicating that the tracks are artificially dug. This can be deduced from the fact that once the vehicle was drawn up onto the original ground surface, which is only covered by a thin deposit of wind-blown sand, the tracks would easily have weathered away.

The interpretation of this evidence produces an argument for a vehicle other than the conventional sledge being used to transport stone away from the quarry. This argument is based on two important pieces of evidence; first is the excessive height of each loading ramp, and second, the reason for the artificially cut tracks. As indicated at the beginning of this paper, the archaeological record supplies little evidence for determining how technology was applied to the han-



Fig. 4: Line drawing of Assyrians transporting stone on a buoyed raft: relief from the Palace of Sennacherib (after Casson, L. 1994. *Ships and Seafaring in Ancient Times*. London, BMP).

dling and transportation of stone in antiquity. In ancient Egyptian iconography, sources from only funerary contexts provide an indication of how heavy loads were conveyed overland and these can be unreliable. Scenes depicting the transportation of stone from quarries almost exclusively show the sledge being used in conjunction with rollers and pulled by large numbers of workers. The most notable depiction is that in the Twelfth Dynasty tomb of Djutihotep at el-Bersheh, which shows his statue being hauled on a sledge from the travertine quarries at Hatnub by 172 men. Old Kingdom portrayals of sledges functioning purely as haulage vehicles in nonfunerary contexts are so far unknown. The only known representation (in a non-funerary context) of the use of any vehicle other than a sledge, is an Assyrian relief dating to the first millennium BCE from the palace of Sennacherib (fig. 4).

The vehicle is constructed from a light wood frame, laced together with withies, cords, or thongs over which animal hides are stretched. Rafts of this type, known as *keleks*, are still used to navigate the Tigris River and are said to be ideally suited to shallow tributaries and rocky rapids. A similar raft-like vehicle on runners, may have been used to transport stone from Chephren's Quarry. It would have been constructed from a variety of locally-available materials such as acacia and tamarisk wood, with an emphasis on constructing a vehicle that was as light as possible. It is interesting to note that in the Assyrian example, inflated animal hides are used to provide buoyancy. Animal hides identical to those portrayed are still used in the northern Sudan for transporting water from wells: such devices could also have been used to transport water from wells at the quarry.

A block of gabbro-gneiss used for the Khafre statue would weigh approximately four tons. Conveying it via water would be far less arduous and require less human resources than transporting it overland. It had previously been assumed that the Nile at Tushka was the destination for the quarried stone blocks, but this would have necessitated travelling over 80 km of undulating terrain. However, if the destination was the nearby Wadi Tushka tributary, then the overland journey would only be 13 km.

An ancient road connects Chephren's Quarry to the Nile at Tushka (now under Lake Nasser), and at 80 km, it is the longest surviving quarry road. Englebach and Murray discovered the road, and in their survey reports suggested it was an animel-worn track probably used for the conveyance of food and fuel supplies during The Middle Kingdom exploitation of the quarry.⁴

Ball and Haynes have both speculated that the Wadi Tushka, a prominent depression northeast of Chephren's Quarry, was once a tributary draining inland *playa* lakes.⁵ If the Wadi Tushka was active in the Old Kingdom due to wetter conditions and higher Nile floods, then it would appear more practical for the stone to be taken north-east from the quarry to there, as it would have been the closest source of water and access to the Nile. This raises the possibility that the geomorphology at the time of the Old Kingdom gave closer access to water for transportation of materials than was previously thought. As Harrell and Bown have observed, the siting of ancient quarries is related to access to permanent water sources.⁶

The overland journey north to the Wadi Tushka from the quarry is approximately 13 km and follows the course of another smaller system that once fed into it. This would have provided an ideal predetermined route of gradual declination relatively free of obstruction. The alternative 80 km route south to Tushka is geomophologically opposite, with undulating terrain and numerous obstructions in the form of sandstone outcrops. Once the vehicle reached the Wadi Tushka it would be floated off on the annual high flood waters then steered independently to the Nile. On its longer journey it could continue being independently steered or towed. As previously mentioned, the *kelek* type vehicle is particularly suited not only to the shallow water of the wadi but also to negotiating the first cataract at Aswan. On arrival at Giza the block would be transferred onto a jetty at the pyramid construction site for final manufacture. The raft would be either dismantled for reuse or sent back.

Discussion on how stone was conveyed from quarries in antiquity has in most cases relied upon iconographic sources due the scarcity of material archaeological remains. This is nowhere more apparent than in Egyptian archaeology. The theory of an amphibious vehicle is proposed because the evidence from Chephren's Quarry requires a reappraisal of stone transportation from remote sources in purely practical terms. The time and effort put into constructing the stone loading ramps means they were purpose-built to accommodate a vehicle other than a conventional sledge. This is borne out by their excessive height and the deep and wide artificially cut tracks.

As previously suggested, it is unlikely that the ancient track located by Engelbach and Murray in 1938 was anything other than a Middle Kingdom supply route. It is clear from the geomorphology of the surrounding terrain that the transportation of blocks of stone weighing several tons along this particular route would have been a considerable undertaking in terms of both time and human resources.

Finally, it is interesting to note that the designation and organization of quarry labor gangs is often attributed to a ship's crew. As Andreu remarks: "...expedition troops had been assimilated to a naval battalion, with a port crew and starboard crew, the rowers having been replaced by the quarrymen."⁷

Notes:

- 1 The author's work at Chephren's Quarry was funded by the Institute of Archaeology, University College, London, and present research is being funded by the Arts and Humanities Research Board. I would like to acknowledge the hard work and support of all the 1999 excavation team members, in particular Richard Lee, Judith Bunbury, and Debbie Darnell, whose input regarding the findings from the excavation have been central to the interpretation of this site. Special thanks to Ian Shaw, Director of the Gebel el-Asr project, who made this project possible. The success of the 1999 excavation is also attributed to the generous sponsorship by Colin Rogers, Director of el-Alsson School in Cairo, for providing us with essential equipment, supplies, and storage facilities at the school.
- 2 R. Engelbach, "The quarries of the Western Nubian desert and the Ancient road to Tushka," ASAE 38 (1938), 369–90. G.W. Murray, "The road to Chephren's Quarries," *The Geographical Journal* 4 (2) (1939), 97–114.
- 3 American Geological Institute Dictionary of Geological Terms, (New York, 1962), 150.
- 4 Engelbach, "Quarries," 369-90; Murray, "Road," 97-114.
- J. Ball, "Problems of the Libyan desert," *Geographical Journal* 70 (1927) 21–83; 105–128; 209–224; 512.
 C. V. Haynes, "Geochronology of Wadi Tushka lost tributary of the Nile," *Science* 210: (1980) 68–71.
- 6 J. A. Harrell and T. M. Bown, "An Old Kingdom basalt quarry at Widan el-Faras and the quarry road to Lake Moeris in the Faiyum," *JARCE* 32 (1995), 71–91.
- 7 G. Andreu, Egypt in the Age of the Pyramids, (London, 1997).