

Science Conspectus

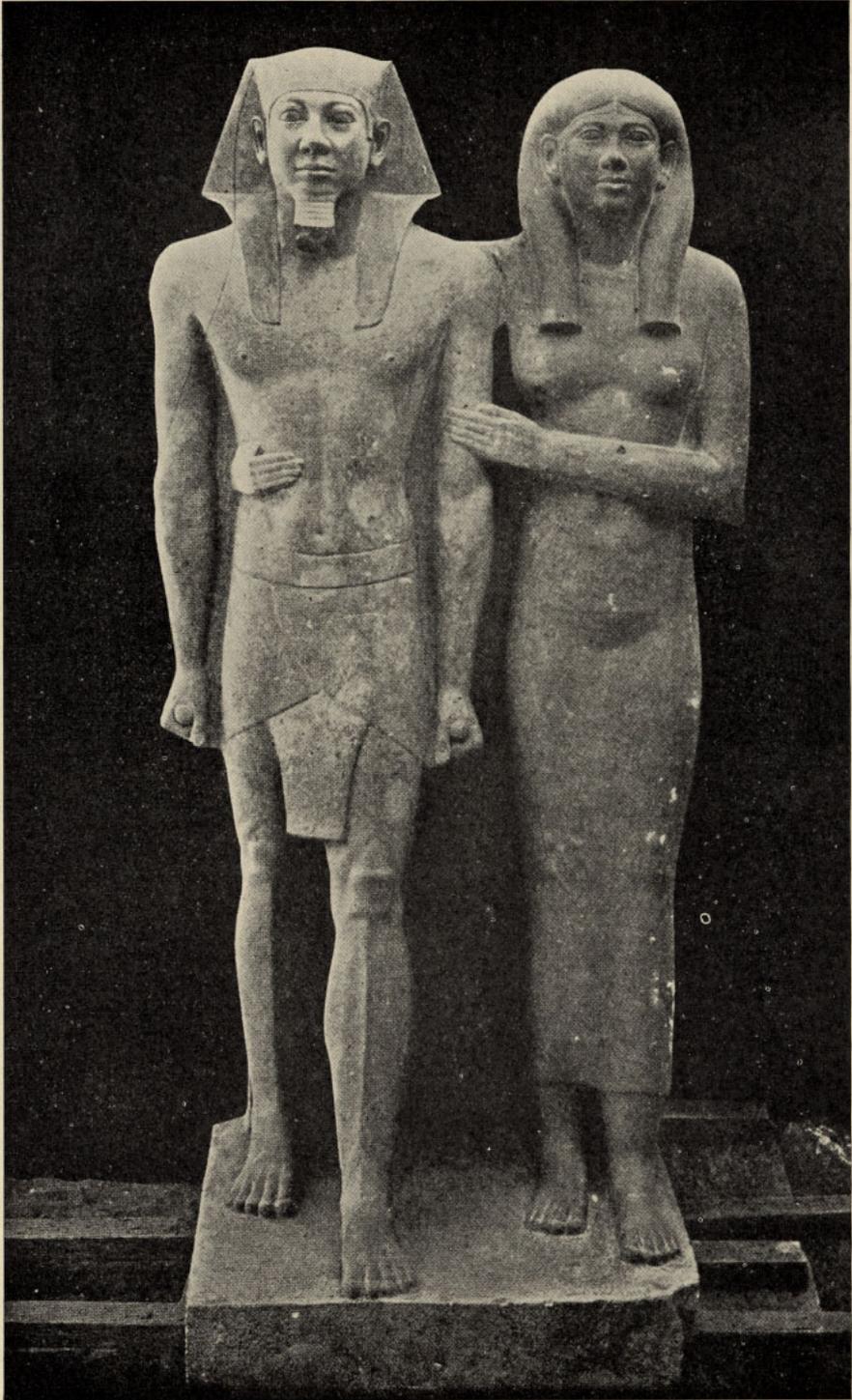


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Slate Group: Mycerinus and His Queen, Fourth Dynasty—Courtesy of *Museum of Fine Arts Bulletin*, Boston

THE DAWN OF CIVILIZATION IN EGYPT

TRACING THE CULTURE OF THE EGYPTIANS NEARLY TO THE STONE AGE—MUMMIES NOT OF ANCIENT ORIGIN—THE SECRET OF THE SPHINX REVEALED

IN A course of eight lectures before the Lowell Institute Professor George A. Reisner outlined the dawn of civilization in Egypt and brought down the improvement in the mechanic arts through its most important period, that of the building of the pyramids. The three salient facts that dominated the lectures were that the ancient Egyptians were living in the Stone Age, that the mummification that is popularly taken to be the important accompaniment of burial was but a phase of it in the later years and that the Sphinx is the statue portrait of Chephren and furnished with its lion's body stands to ward the spirits from the tomb of that monarch, the second pyramid. About these facts was woven a most remarkable story of rise and fall of the nation, wastefulness, conservation, change in character of the monarchs and marvelous improvements in the methods of handling stone and other materials.

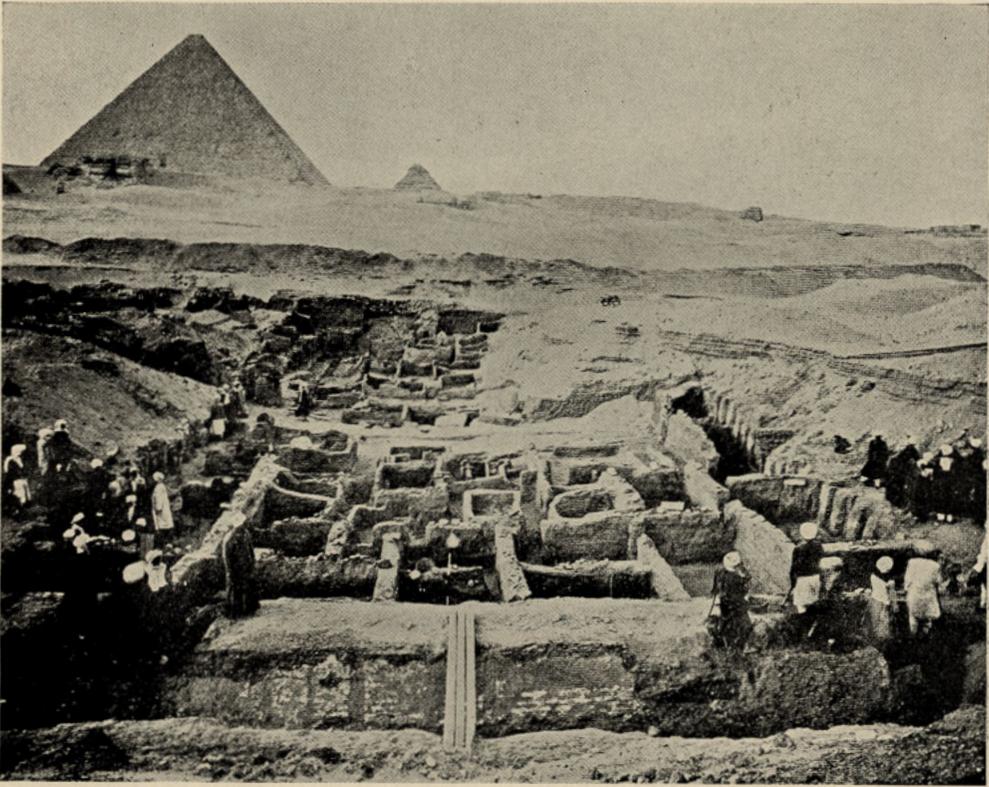
The first of the lectures was a clear exposition of the kind of evidence and the methods of securing it. The later results have been accomplished by the joint expeditions of the Boston Museum of Fine Arts, and Harvard University and which were along very different lines from the methods of years ago. It was undertaken on the plan of commercial enterprise, the ground inspected, the methods of attack outlined, and when once the work was begun it was followed in every detail by a group of trained specialists. The synchronous operations included excavation, card cataloguing, photography and the mapping of the cemetery. For it should be understood that what is known of the life and habits of the old Egyptians has been preserved through the accompaniments of burial. The man in the spirit world needed the things which he had been accustomed to

use in life, and these were buried with him.

With reference to the efficiency of the work Doctor Reisner noted that for the excavation of a cemetery of two hundred and fifty graves, only eight days were necessary and on the ninth day after the photographs were taken of the untouched ground, the work had been finished and the laborers sent elsewhere for other excavations.

In showing the extent of the excavations, Doctor Reisner stated that in view of the flooding of the country by the raising of the Asouan dam, the Government of Egypt had asked that everything of archæological or historical value be taken up. There were one hundred and fifty miles of sand-blown desert, apparently a hopeless task, but it was possible to march an army of pickaxe wielders in lines across the country. A single stroke of the pick was enough to determine whether it was worth while to do more, and in this way the whole area was prospected at the rate of several miles a day. There were, of course, fundamental principles underlying the method, one of them being that remains would be found only in soil that had been overturned, so that if the single stroke showed the natural geological structure, it was useless to spend more time.

The chronology established by Doctor Reisner and his assistants is the following:—Pre-dynastic, B. C. 4500 to 3300; first and second dynasties, B. C. 3300 to 3000; Old Empire, B. C. 3000 to 2400; and Middle Empire, B. C. 2400 to 1600. The New Empire then ensued till about B. C. 1200, then the Egyptian Renaissance, and from B. C. 663 down was the Persian Period. This chronology does not reach such enormous antiquity as have some other computations of the past.



Valley Temple of Mycerinus in Process of Excavation. Pyramid of Khufu (Cheops) Beyond—Courtesy of *Museum of Fine Arts Bulletin, Boston*

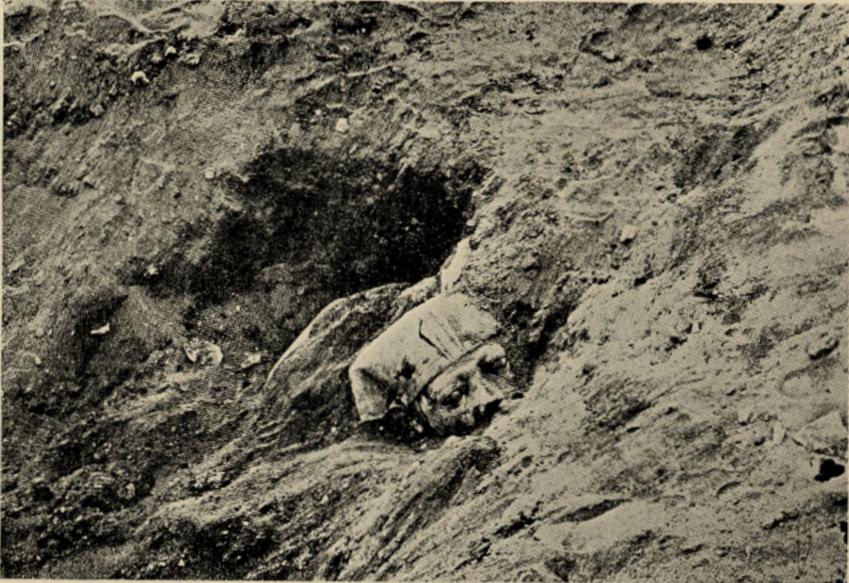
An interesting portion of the second lecture was the outlining of the basis on which this chronology rests. There is a fixed date, that of Alexander in B. C. 332, and back of that about thirty years an Egyptian priest, Manetho, made a list of the kings of Egypt. Some of his figures are wrong, much of his material is as yet unidentified, but much remains good in the light of other evidence. There is a papyrus in Turin written apparently in the New Empire on the back of which some one has placed a list of the kings including the mythical ones. The list seems to be accurate, but there are important breaks in it of four or five hundred years. Then there is the Palermo stone, resting in the museum of that city, but carried to Sicily, no one knows how, perhaps as ballast. This is the annual record of the height of the Nile, which in an

interesting manner identifies the year by the action of some king. Then there are the inscriptions in the tombs.

In his second lecture Doctor Reisner took up the chronology and race mixtures.

"It is not the question at the moment which is the more ancient," said the lecturer, "but it is true that the Egyptian relics have been much better preserved. In Egypt there was a people whose whole life is now known to man and in its study it is possible to trace the culture back to a time that was pretty close to the Stone Age."

The speaker said that the dates presented by him are less distant by two or three thousand years than those given by some writers in published works, but he believes that his figures are founded on valid authority.



First View of Head of Alabaster Statue of Mycerinus—Courtesy of *Museum of Fine Arts Bulletin*, Boston

As to the people the sculpture indicates clearly distinct immigrant racial types, Negro, Berber, Arab, Philistine and Asiatic. Skulls found have been restored to the semblance of the living man, and from the whole investigation it would appear that with the native Egyptian stock two races were mingled in ancient days; in the north, the Semitic stock was mixed with Berber and Libyan immigrants, while in the south it was the original Semitic mixed with Negro. It was the northern mixture that developed the country and built the splendid monuments and cities. In the south the people have done nothing and are now about where they were in the pre-dynastic days.

The illustrations that Doctor Reisner presented at his third lecture showed the actual material from which this ancient history has been reclaimed and roughly the time may be divided into the Stone Age when the metals were practically unknown, the middle pre-dynastic, when traces of copper are to be found and then the later period when copper was used for the heavier articles such as effective weapons. Certain kinds of pottery or stone ornaments belong infallibly to certain periods.

The Egyptian Stone Age man was weaving baskets and cloth, dyeing his cloth, tanning, making pottery by hand and decorating with crude, yet unmistakable representations of the animals and objects about him. He could cultivate at least one sort of grain, barley, for the dissection of well-preserved stomachs has presented the grain undigested. It is also true that the whole country was culturally a unit, a fact abundantly proven by the universal distribution of articles, like stone objects, whose original locality can be proved by the parent ledges. And again some of the most interesting objects of the decorative art were ships of weird and wavy pattern, which their vases have preserved. It is thus unquestioned that the Nile was in the earliest days used for trade and articles made in few places had universal distribution.

As one of the important matters in which the people are generally mistaken in their notion, Doctor Reisner called attention to the peculiar posture in which the ancient men along the Nile buried their dead. The body was doubled up with the knees near the chin and the hands before the face. The head was usually



First View of the Slate Group of Mycerinus and His Queen—Courtesy of *Museum of Fine Arts Bulletin*, Boston

towards the south. The mummy, which everyone associates with Egyptian burial, is, comparatively speaking, a modern innovation, although the earlier kings were indeed mummified. Much was told about the plundering of graves, which has been done in all ages for the valuables buried with the dead.

The progress of the country was admirably shown by the mineral contents of the graves which serves to give an additional measure of their antiquity. In the earliest tombs galena and an oxide of iron, used for a face paint, were found.

Then in the next period appear some manufactures of gold or copper and in the last of the pre-dynastic periods heavy items, weapons first, because more necessary, characterize the findings. The invention of the needle was another of the interesting stories, illustrated by pictures of the specimens themselves. The awl was used for five or six hundred years in ancient Egypt till the first crude needles were made of copper spindles with the top bent to one side making an eye, and centuries afterwards it occurred to some-

one to drill an eye through the spindle itself.

Doctor Reisner stoutly defends his neolithic Egyptians against the claims that they were cannibals, showing first that but few instances in the thousands of graves examined, perhaps one grave in five thousand, afforded the evidences that had been brought forward in support of the assertion that they ate their fellow-men. Some joints apparently gnawed were shown by the speaker to bear the marks of predatory beetles which attacked the bone for its enclosure of marrow.

"We have thus seen," said the lecturer, "that the Egyptians grew from savages to learn gradually the arts of metal working; they became prosperous and with prosperity came the struggle for wealth. The effect of this was to divide them into two great factions, one in lower Egypt and the other in upper, and for one hundred years before the first dynasty there was a constant struggle for control. These factions were united by King Menes."

Something of the political history of the Egyptians showed how when there



Upper Part of Slate Group: Mycerinus and His Queen, Fourth Dynasty—Courtesy of *Museum of Fine Arts Bulletin*, Boston

was prosperity, there came union between the different tribes and the whole of Egypt came under the rule of a single sovereign. The holding of the wealth in the hands of a single family resulted in the expenditure of the surplus in great public works which took the form of tombs of kings, etc., enormously costly even with slave labor, and in Egypt there were alternate periods of financial depression and wealth. This is shown in the tombs, for the implements attending the interment in the midst of a panic in Egypt were inferior in quality and number. The graves thus tell after many centuries much of the financial story of the country.

There were many interesting inventions, for example, the mechanical stone pot-borer. First there is in the tombs an inferior quality of clay vases, these improve and later when it was possible the first art declined in favor of machine-made stone vases. The older clay vessels

were reserved for religious purposes and occur in the graves with the others. Later better pottery vases replaced the stone ones, these being the ups and downs of the arts, and Doctor Reisner expressed the opinion that no art is ever lost until there is a better one ready to take its place.

Much of the earlier story had to do with the construction of houses. Information about this is conveyed by the tombs which are of the same type. It was a mud-brick architecture with wooden rafters to support the roof. Later the lintel and the arch were used, the latter being one made by corbelling out the bricks till they met, limited to what could be held up by the hands till the key was placed, while the obliquely-laid barrel arch was known to these people. This could be made without the need of a form to hold it while under construction.

Of the ancient Egyptian architecture

Doctor Reisner presents the same idea that other speakers have brought forward in discussing the Greek architecture, that the later work of the country merely followed in some other material the forms of the earlier, cruder material. The original building of the Egyptians was with a mud brick. The people never lived in caves, as has been asserted by some others who seek to trace the architecture to such an origin.

And somewhere in here there came the invention of letters.

There was outlined how culture spread among the people. While it was true that the kings reserved the best workmen for their own edifices, still there were slack times, when the stone masons and sculptors went home while others sought other employ, so gradually it was possible for minor princes and officers to secure excellent art.

The answer to the riddle of the Sphinx was the most striking climax of Doctor Reisner's lectures, the unfolding of the remarkable work of the Boston-Harvard expeditions in determining what the Sphinx really is. It is a portrait of Chephren, the builder of the second pyramid, mounted in the usual way on the body of a lion to ward away the evil spirits from the tomb. This discovery came about in a perfectly logical manner. Doctor Reisner set deliberately at work to unearth for the second pyramid what experience had shown should be somewhere, a valley temple, lower than the pyramid and connected with it by means of passages. This was found by excavation and in the end, from its position the real secret of the Sphinx was unravelled. When the fact was discovered it was fairly easy to verify it by comparisons with other portraits.

Already at the third pyramid the same kind of investigations had been carried forward and its relation to Mycerinus established. It proved to have at its base what was sought with the advanced knowledge of Egyptian customs, the temple of the king who erected the pyramid. From this it is customary to have a gallery extending down hill to a lower temple. These items were found, but not

until a sixth dynasty temple, covering the original one of the fourth dynasty, was opened and removed. The outlines of the two temples were established and in excavating the splendid statues of Mycerinus and his queen were discovered, the alabaster statue of the king and a series of slate triads, three figures to a panel.

The story turned largely about Mycerinus, the builder of the third of the pyramids in the great group, and his wife, whose statues recently excavated from his temple, form a showing in the Boston Museum of Fine Arts which is declared to be incomparable and priceless. The wonderful alabaster head in the same department of the Museum is that of his son.

These monuments present a faithful picture of Egyptian art, a picture that is not to be duplicated in the case of any other nation of antiquity. The arts reached the finest stage, reliefs, statues, magnificent buildings, and after the sixth dynasty it may be said that the Egyptians learned nothing more excepting the making of glass. The time has been termed the Pyramid Age, in which there were erected these enormous and beautiful temples and tombs.

Household processes like weaving, domestic arts like harping and singing, the wine press, hunting, shipping on the Nile, fishing and netting birds, the agricultural processes, plowing, reaping, threshing, and trade operations of weighing and storing—all are shown. From the monuments the life of the people is made known. The tombs give the relics on which can be based the knowledge of durable productions, vases, pottery and other manufactures, while the tombs themselves afford a good working knowledge of Egyptian architecture.

The most striking exposition of the whole series of lectures from the mechanical point of view was the development of the art of masonry almost within a single generation at the time of the building of the pyramids. Before then the work had been of mud-brick and of stone in imitation of this, but now there came into existence the extraordinary ability to

cut, handle and lay stone that has hardly had its parallel in all mechanics.

Important side issues of history, the development of painting and of sculpture formed an interesting framework within which this technical knowledge was set.

THE BOSTON SUBWAY

THE Cambridge Subway soon to be opened, brings up the question of the general plan of subways which is being developed in the city of Boston. The situation in the city of Boston is peculiar because if the business district be considered at the center of the wheel, the territory which must be reached from this center is nearly three fourths of a complete circle. It is manifestly out of the question to build subways or elevated railways to each one of the outlying suburbs on account of the great cost. The general plan being followed, then, is to build two combination subway and elevated systems which cross each other at right angles in the central portion of the city. The one running north and south will extend when completed from Malden on the north to Forest Hills on the south. At the various stations along this line, surface cars come in and transfer their passengers to the elevated. By this means the surface car traffic is to a large extent kept in the outlying districts where the congestion of streets is a minimum, and passengers are transferred from the surface cars to the elevated system which then brings them in to their destination.

The other line being developed extends from Cambridge on the west under Beacon Hill at present as far as a new station built underneath the present Park Street Station. **Ultimately this is to be extended down Winter and Summer Streets, past the South Station and thence in a southerly direction to Andrew Square in South Boston.** When this whole scheme is completed, surface cars will be collected principally at Harvard Square from Cambridge and the suburbs in that direction and at Andrew Square from Dorchester and South Boston.

The terminal station at Park Street is so built that when the tunnel is completed, it will become a way station instead of a terminal without any structural changes. At Harvard Square and at Park Street, the stairways are such that the transfer from surface cars to the subway and *vice versa* is made without the use of any transfer checks, and the platforms are so arranged that in any given passageway people can move in only one direction. There are also separate loading and unloading platforms for the subway trains which tend, of course, toward freedom of movement, as people leaving and entering trains do not meet. At Harvard Square there are also loading and unloading platforms for surface cars for the same reason. The whole arrangement is part of a very carefully worked out plan for accelerating the movement of traffic. For instance, the present running time of surface cars from Harvard Square to Park Street is twenty-three minutes. The running time of the subway trains will be between seven and eight minutes. When this subway is completed to South Boston, it will be seen that ready means will be afforded to transfer to and from the old Tremont Street Subway as well as to and from the Washington Street Tunnel. It will also give better access to the South Station than has heretofore been practicable.

L. E. M.

LARGEST OIL PROPELLED SHIP

THE *Toiler*, an oil engine ship, 248 feet long and drawing 14 feet loaded, is said to be the largest vessel afloat driven by oil. This ship has but recently entered the Great Lakes for use by the Anglo-Saxon Petroleum Company. She has twin screws driven by two 4-cylinder 180 horse power reversible Diesel oil engines. The machinery weighs 60 tons less than equivalent steam equipment. The oil is carried in a double bottom where water ballast is usually carried. The use of oil instead of coal effects a saving of 120 tons. The German battleship *Goeben* is now being built which it is said will have the central shaft driven by a 12,000 horse power Diesel engine.