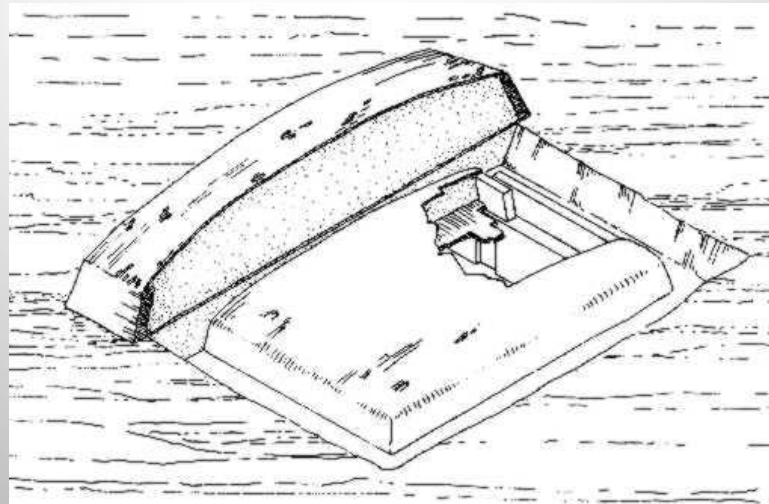


Royal Substructures in the Old Kingdom

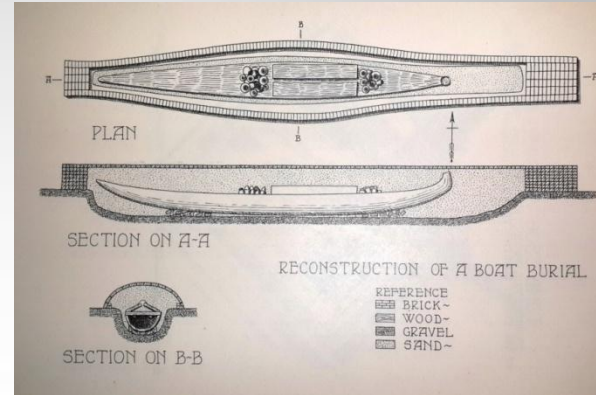
Simple pits changed to complex tunneling
before the traditional substructure

FIRST PART: FROM AHA TO KHUFU(MENES TO CHEOPS)

SUBSTRUCTURES OF THE FIRST DYNASTY, AHA AND DEN BURIAL CHAMBERS



BOAT PITS FROM AHA TO KHASEKHEMWEY



**AFTER KHASEKHEMWEY NO BOAT PITS HAVE BEEN DISCOVERED UNTILL KHUFU,
ONLY AN OAR (OF A MODEL BOAT) AT SEILA**

MANY EXPLORERS; BEFORE AND; AFTER



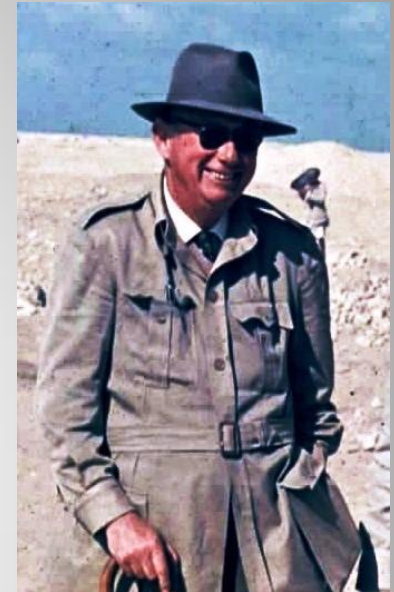
W. M. F. PETRIE



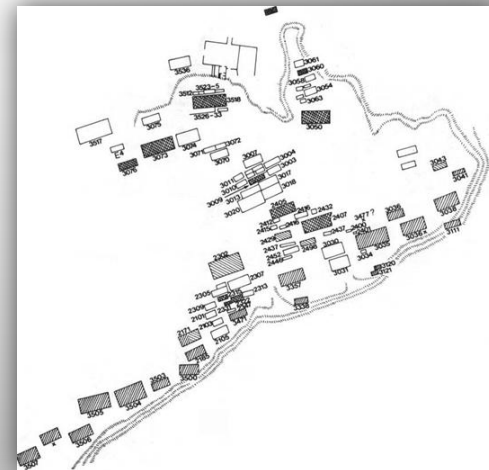
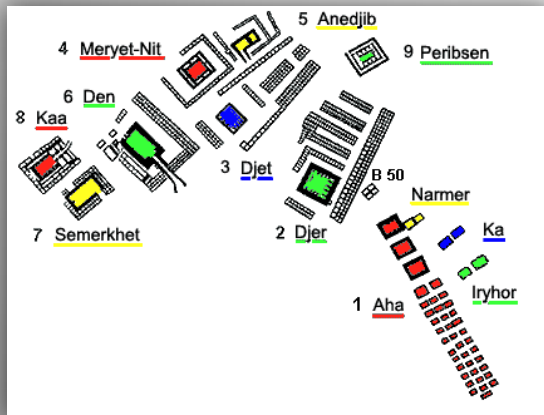
W. KAISER



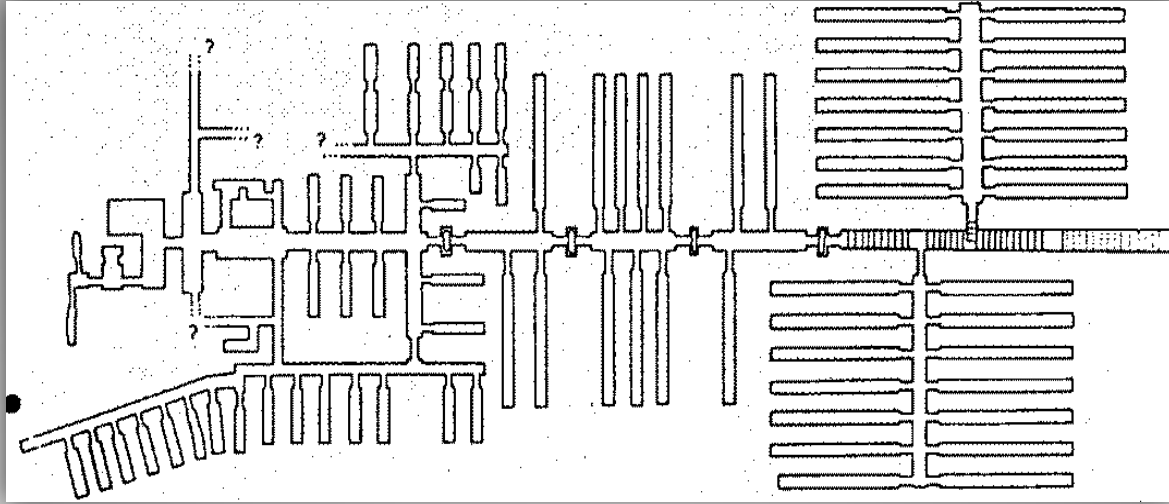
G. DREYER



W. B. EMERY



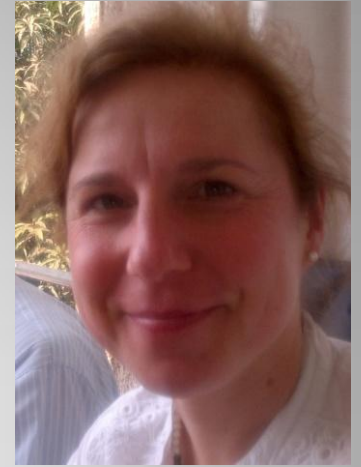
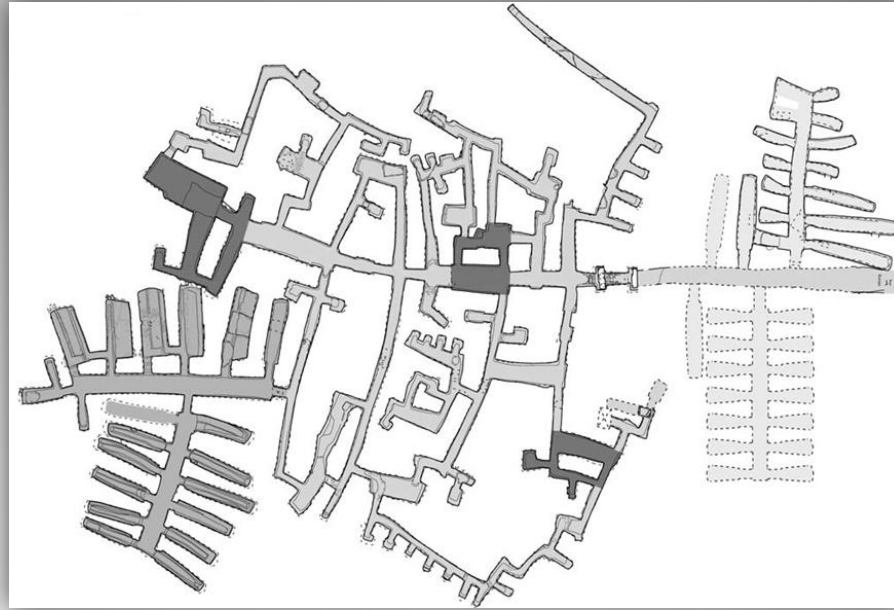
SUBSTRUCTURES OF THE SECOND DYNASTY; HETEPSEKHEMHWY, CROPPED BY THE DRY MOAT



SUBSTRUCTURES OF THE SECOND DYNASTY; NYNETJER



SELIM HASSAN



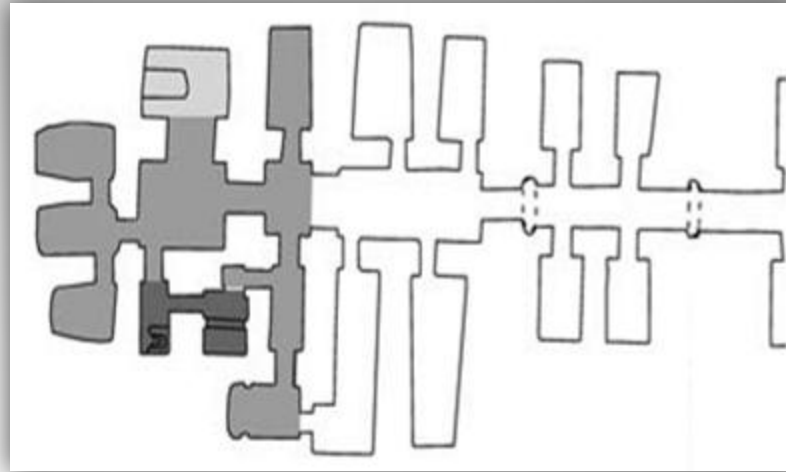
CLAUDIA LACHER



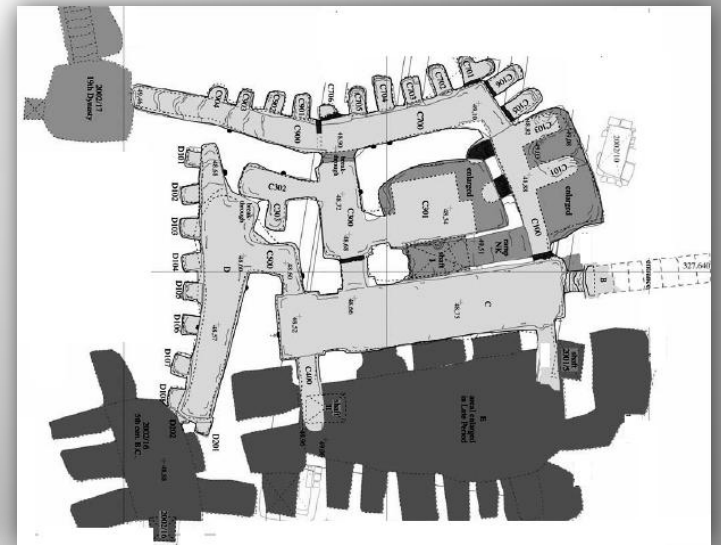
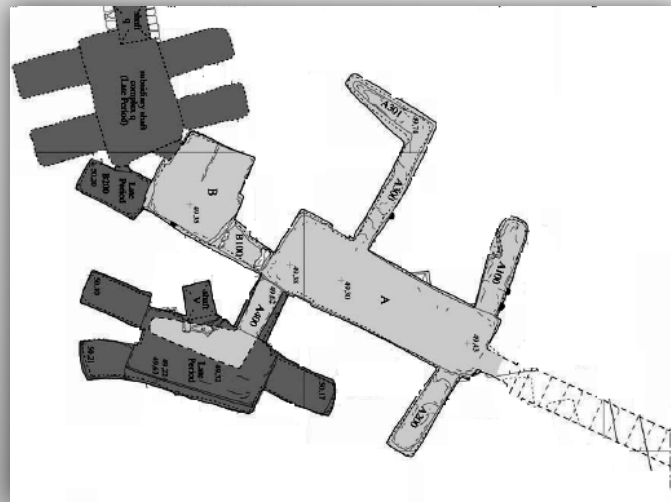
SUBSTRUCTURES OF THE SECOND DYNASTY; DATING TO NYNETJER AND KHASEKHEMHWY



J. E. QUIBELL



ILONA REGULSKI



TUNNELS OF IMHOTEP



C. M. FIRTH

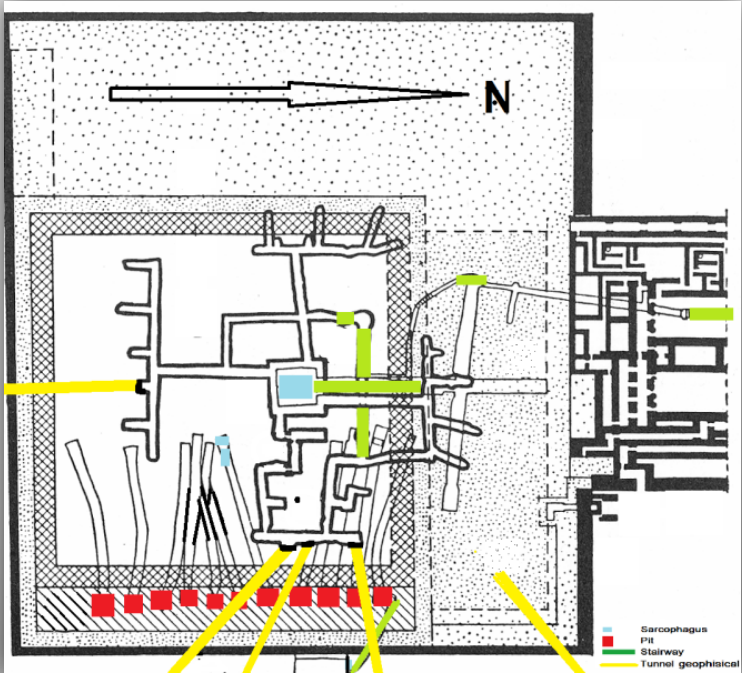
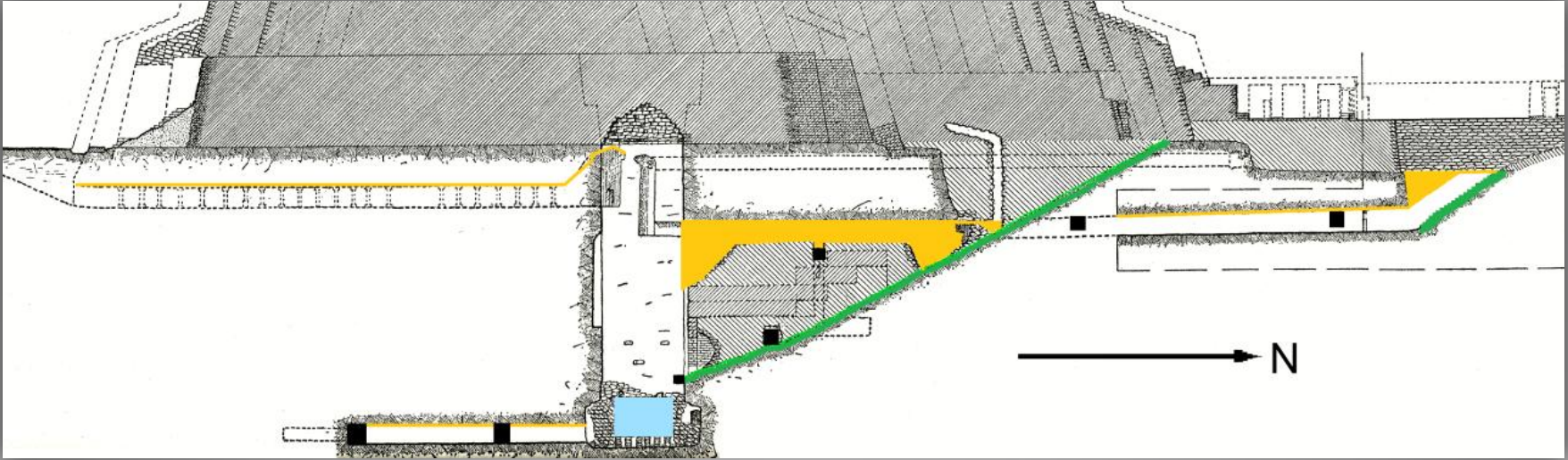


J. E. QUIBELL

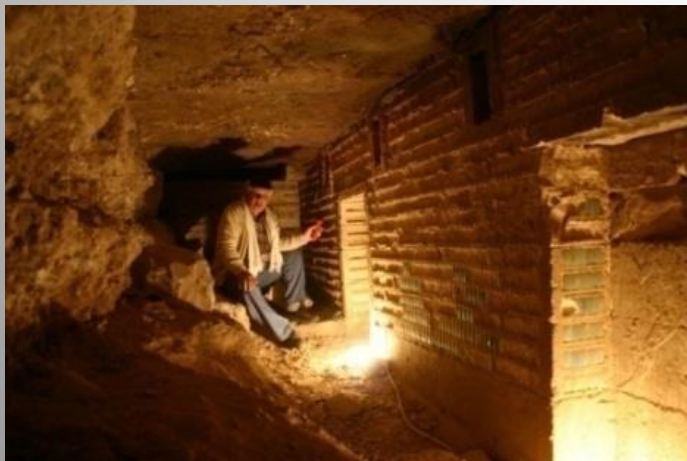


J. PH. LAUER

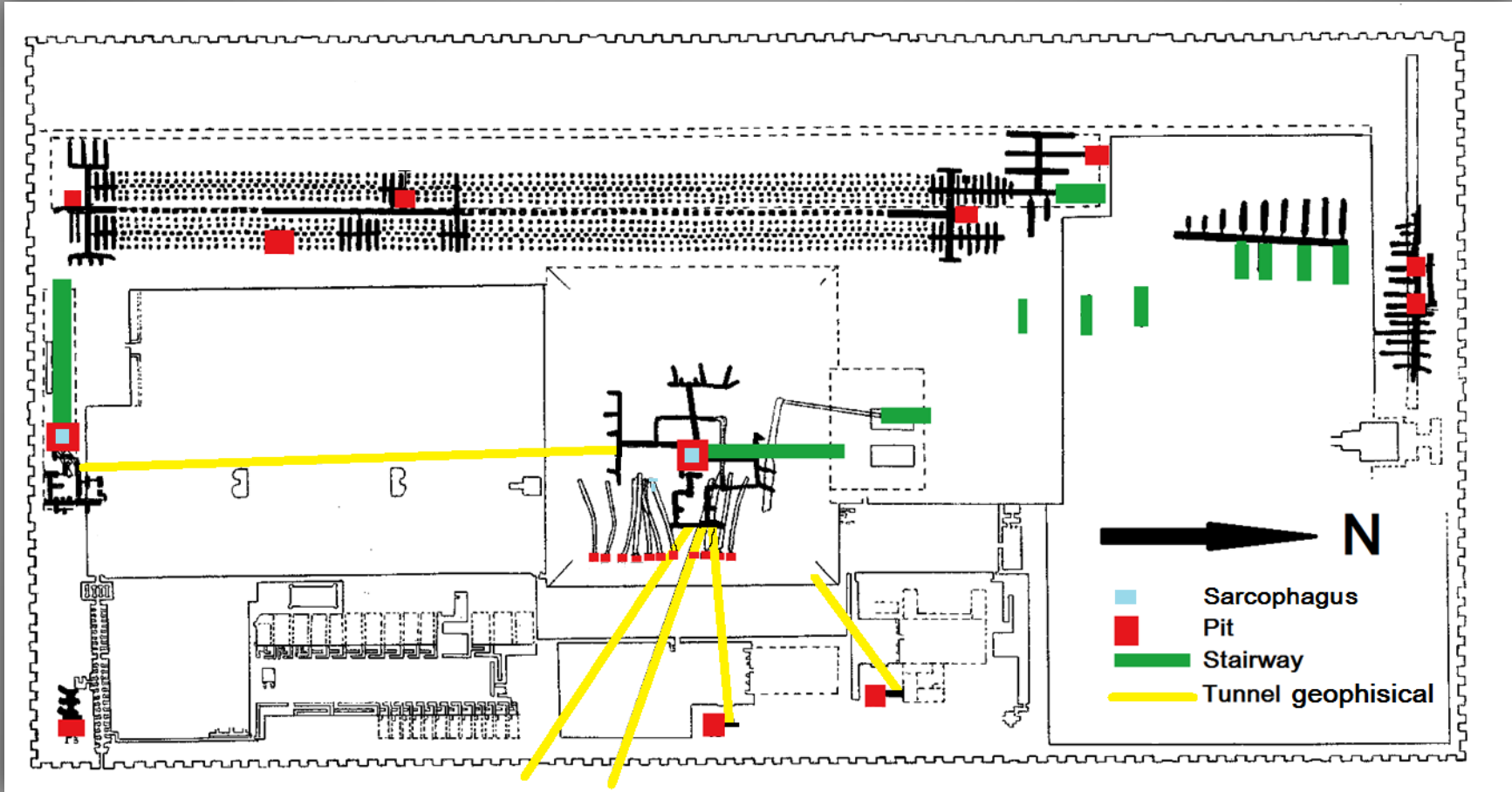
SECTION AND PLAN OF THE STEP PYRAMID



2 ENTRANCES AND CHAMBERS OF THE STEP PYRAMID



SUBSTRUCTURES WITHIN THE TEMENOS WALL



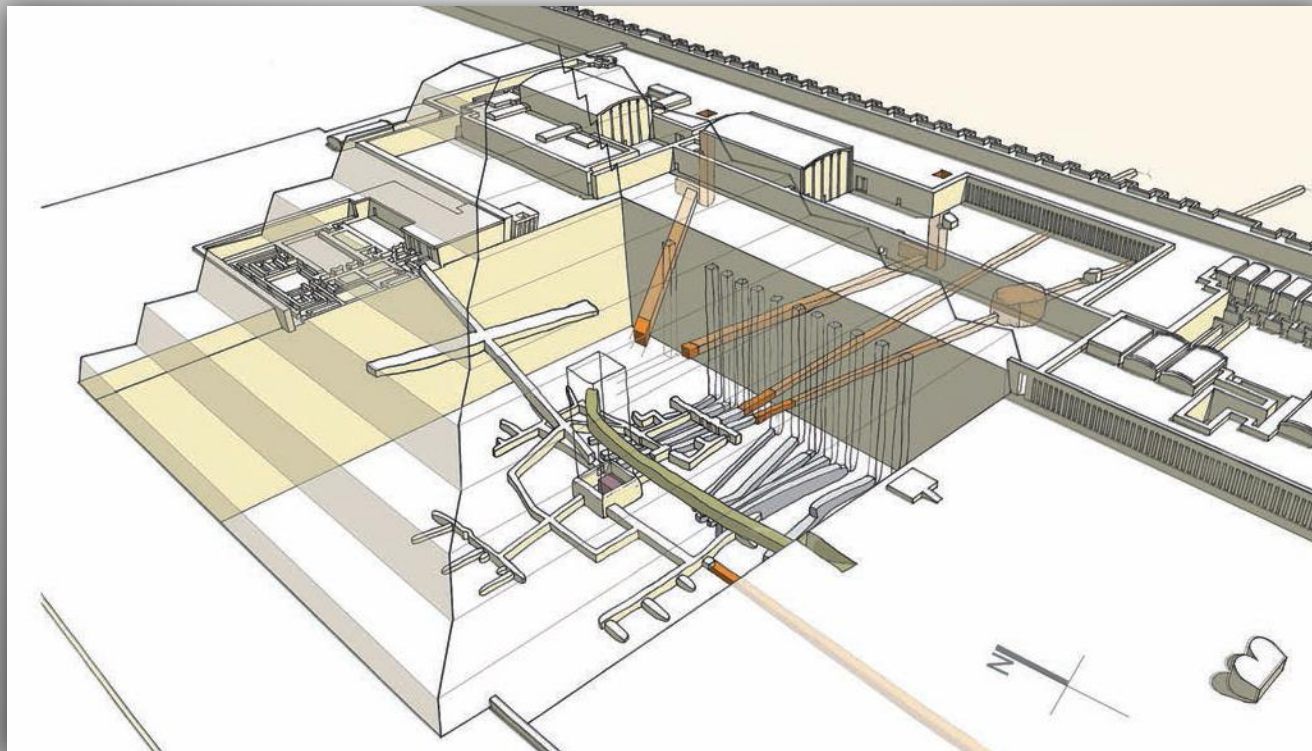
MODERN EXPRESSIONS



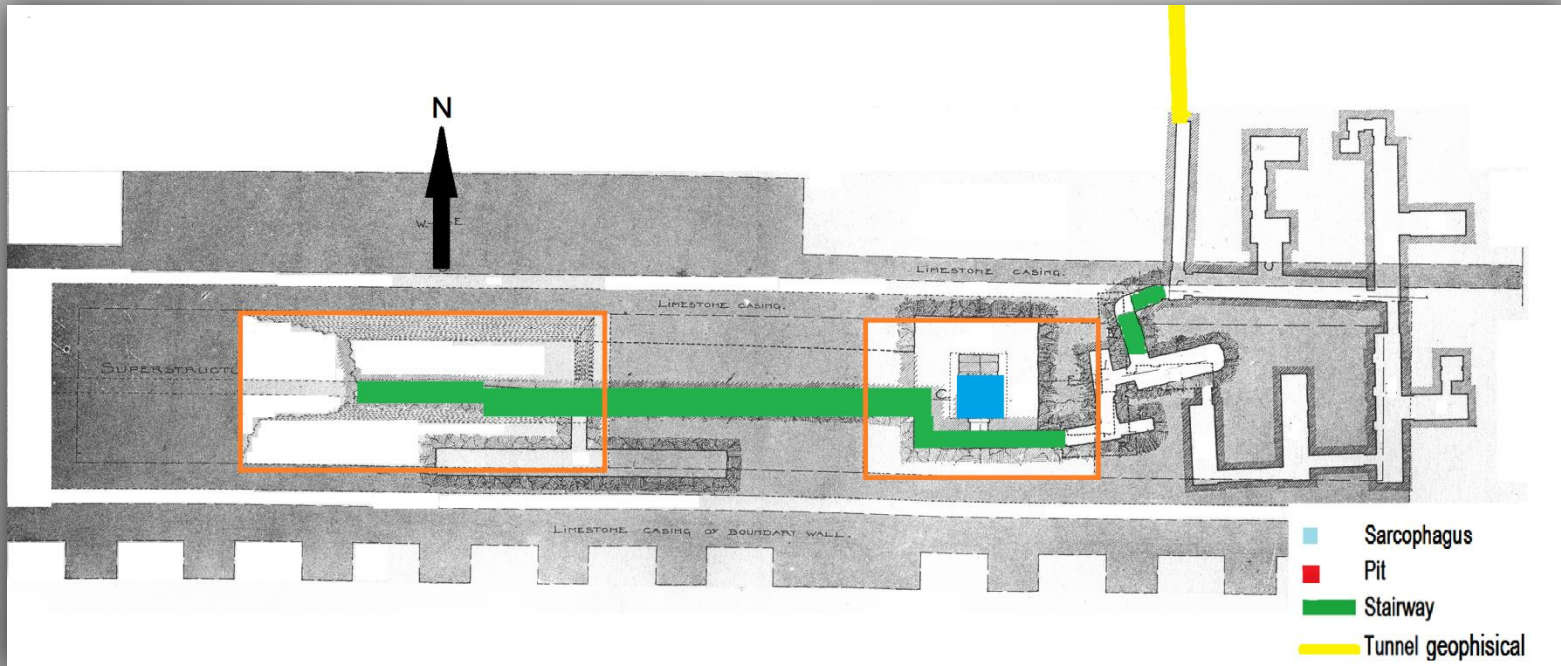
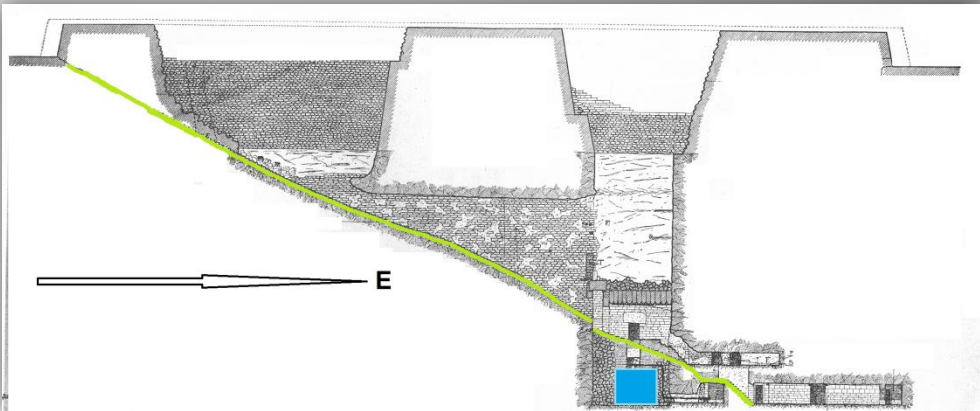
BRUNO DESLANDES



FRANK MONNIER



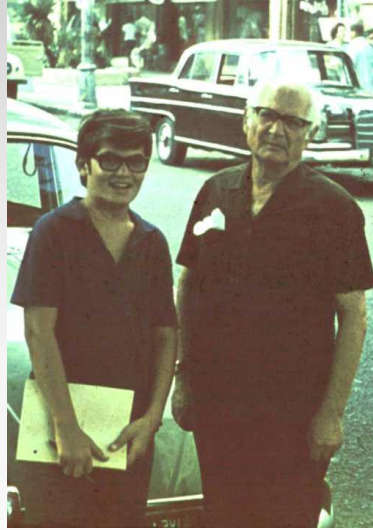
THE SOUTH TOMB OF THE COMPLEX OF NETJERYKHET



SCHOLARS WHO BROUGHT THE DRY MOAT TO OUR KNOWLEDGE



SELIM HASSAN



ZAKI SAAD



ZAKI ISKANDER



AHMED MOUSSA



KAROL MYOELIWIEC



TOMASZ HERBICH

THE OUTER, INNER, WEST, AND SE CORNER OF THE DRY MOAT

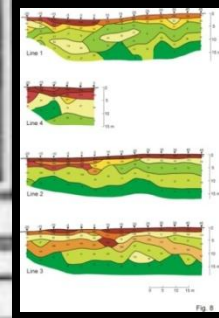
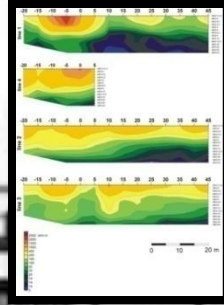
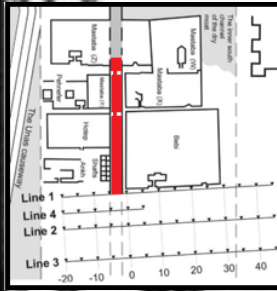
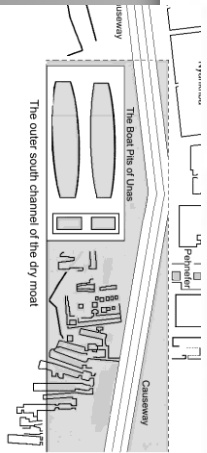
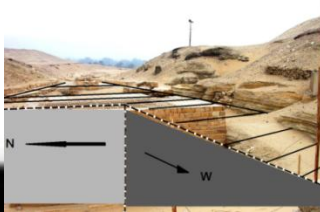
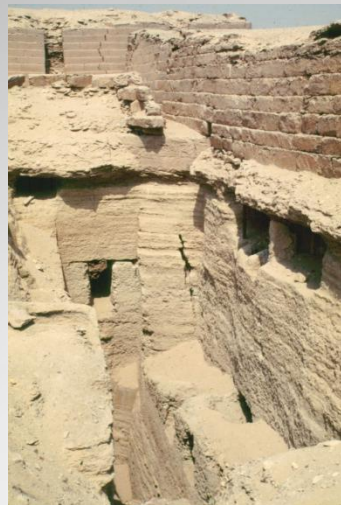


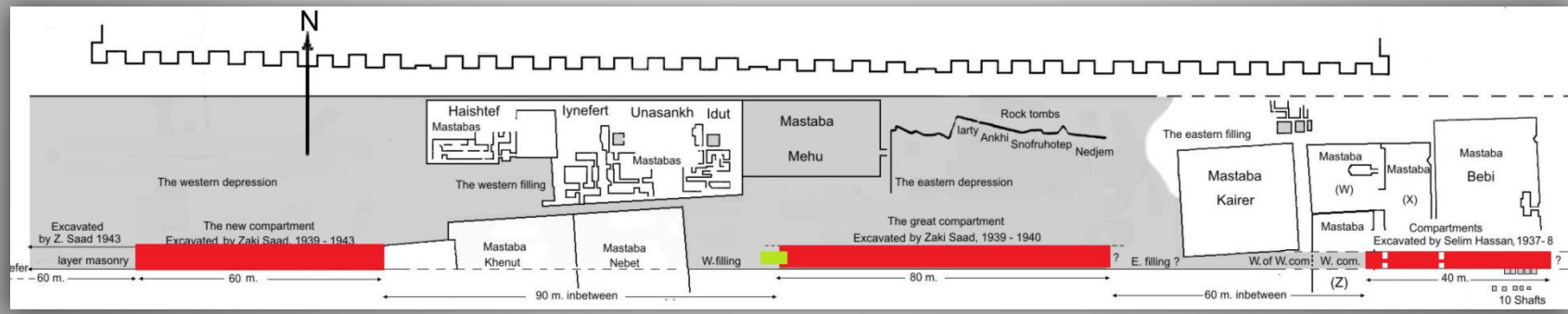
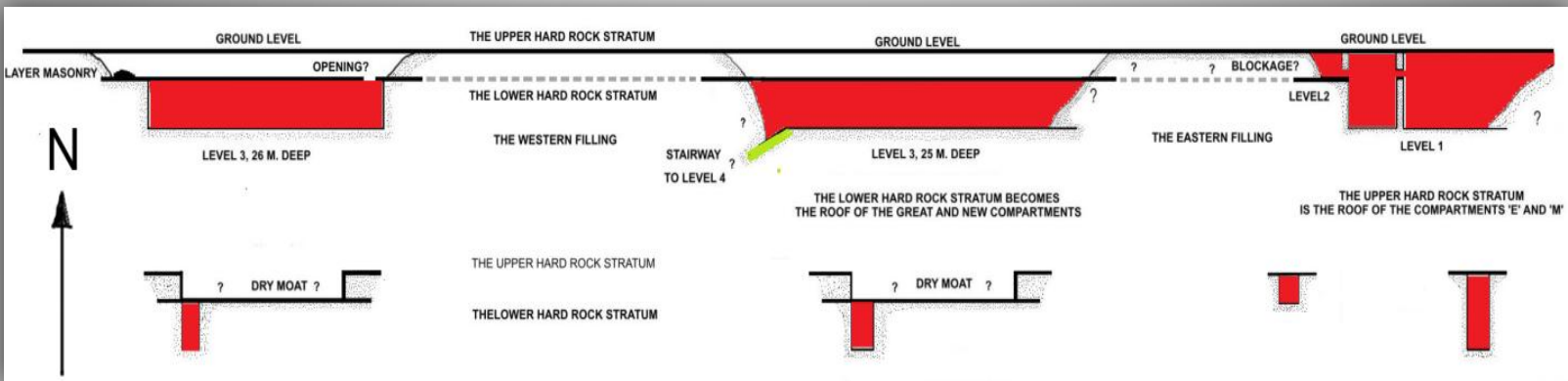
Fig. 5



COMPARTMENTS OF THE INNER SOUTH CHANNEL OF THE DRY MOAT



SECTION AND PLAN OF THE INNER SOUTH CHANNEL OF THE DRY MOAT



BET KHALLAF



KI



J Garstang (1876 - 1956)

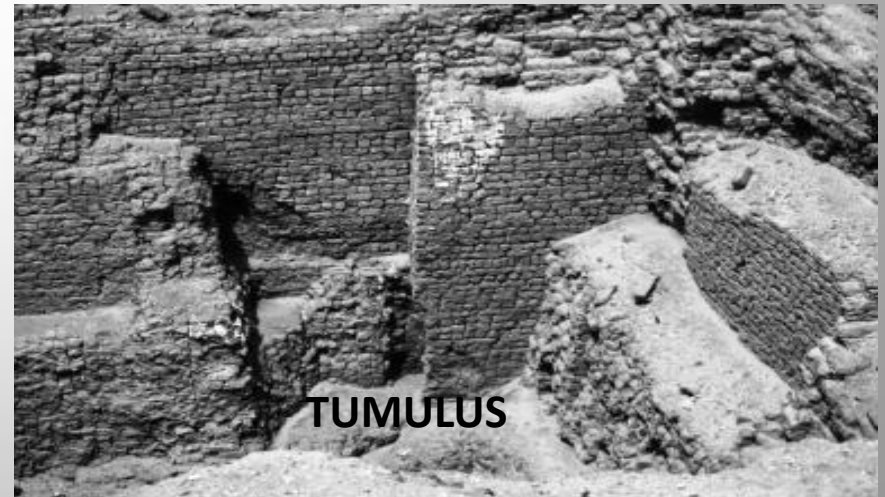
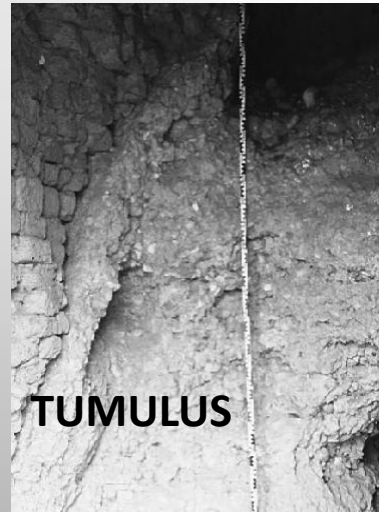
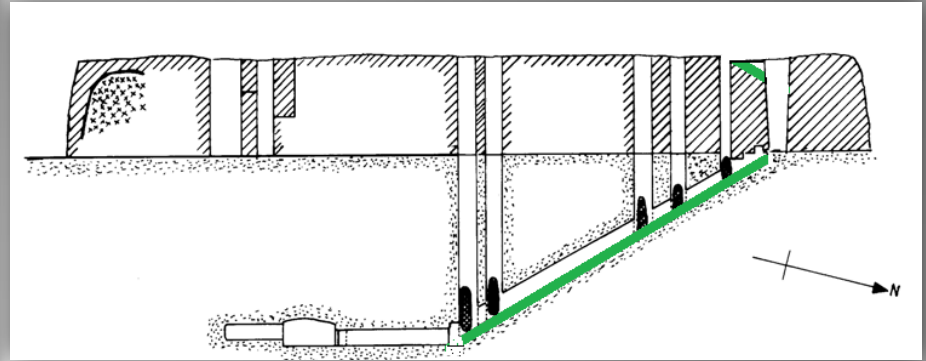
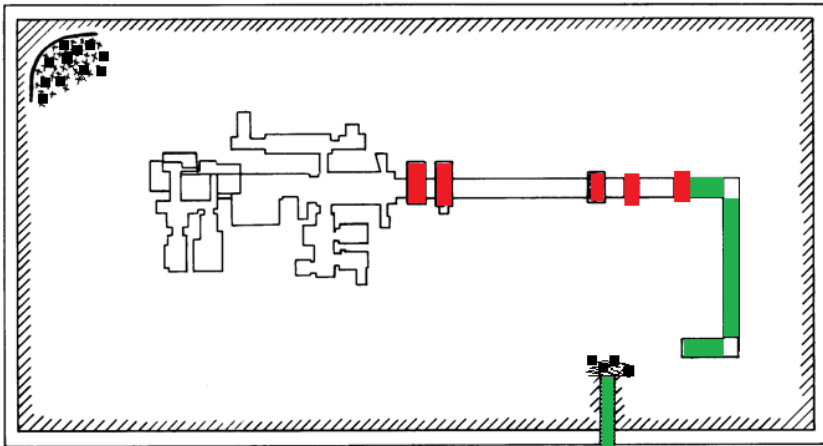


K2

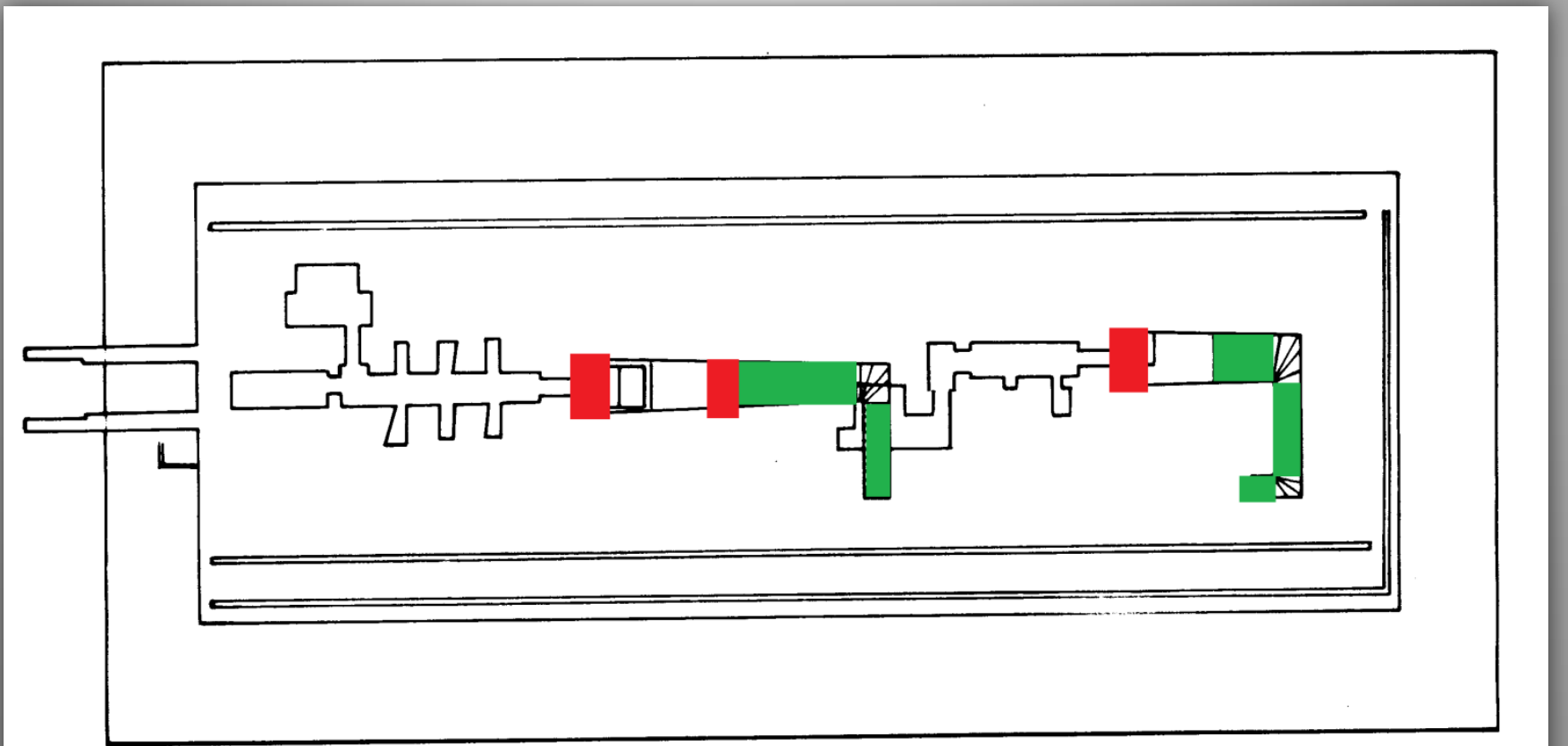
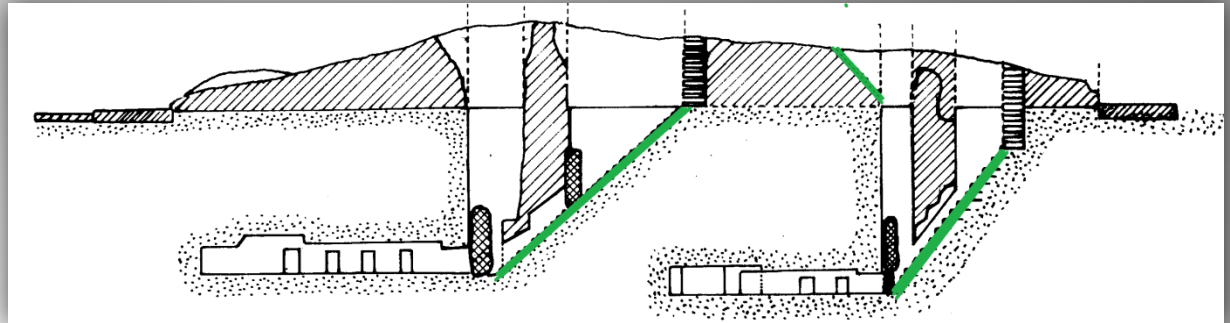


ILARIA INCORDINO

MASTABA K1 AT BET KHALLAF



MASTABA K2 AT BET KHALLAF



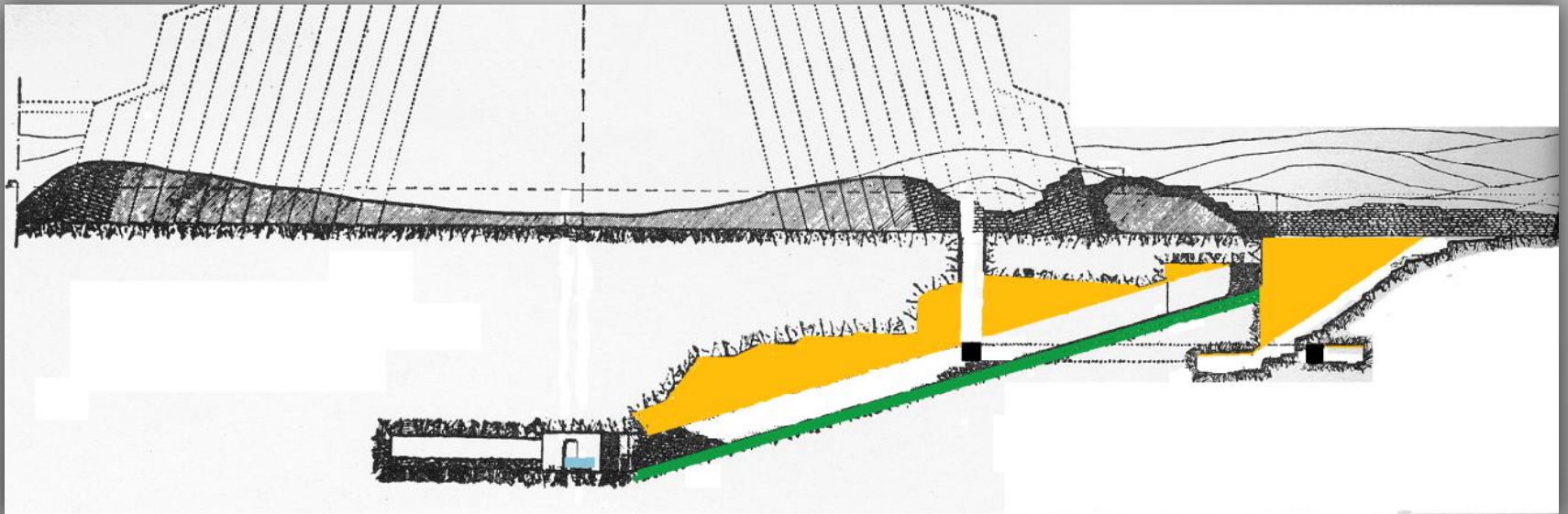
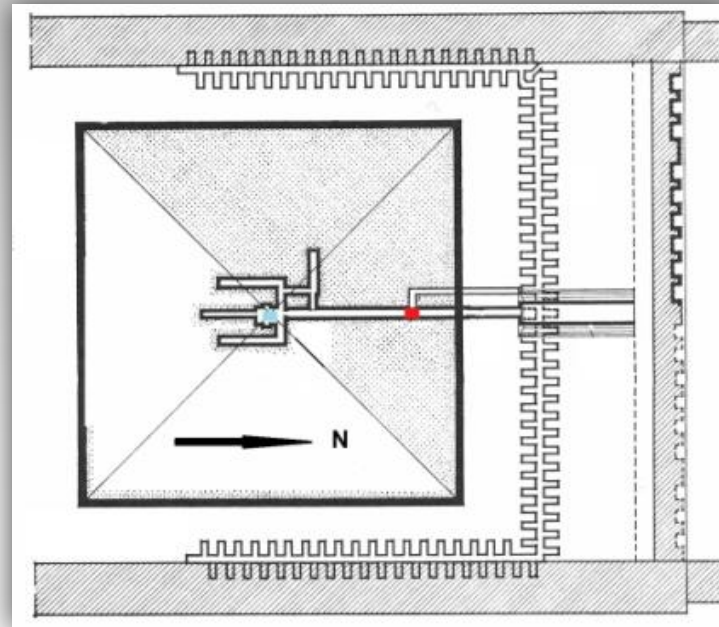
SEKHEMKHET



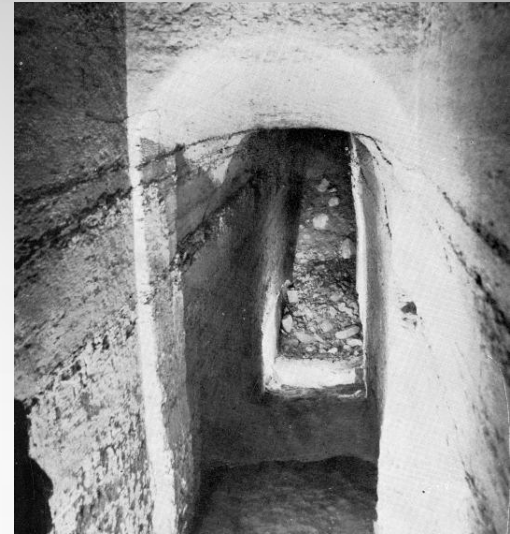
ZAKARIYA GONEIM



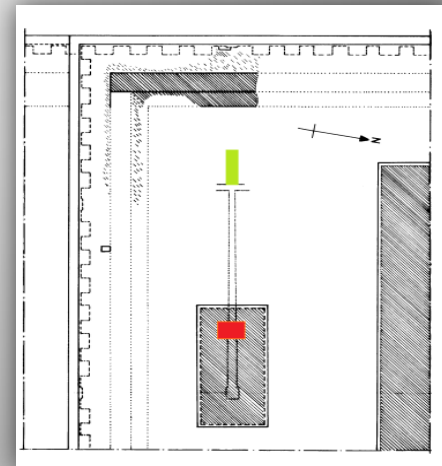
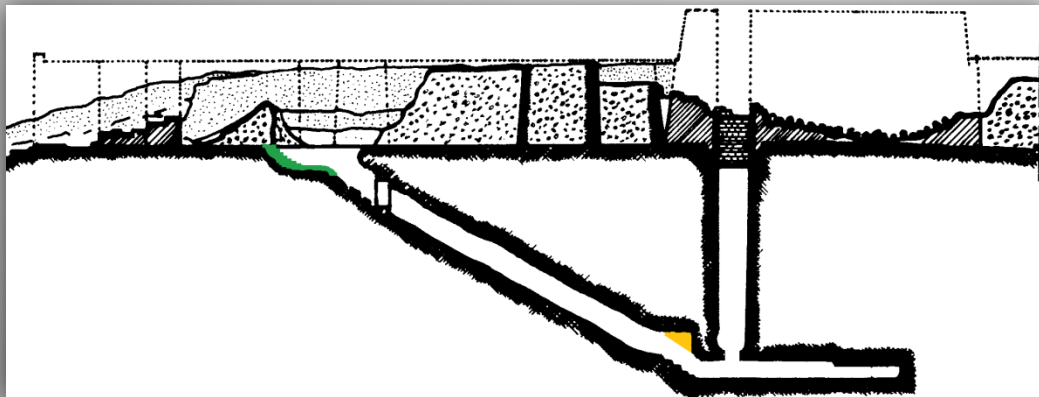
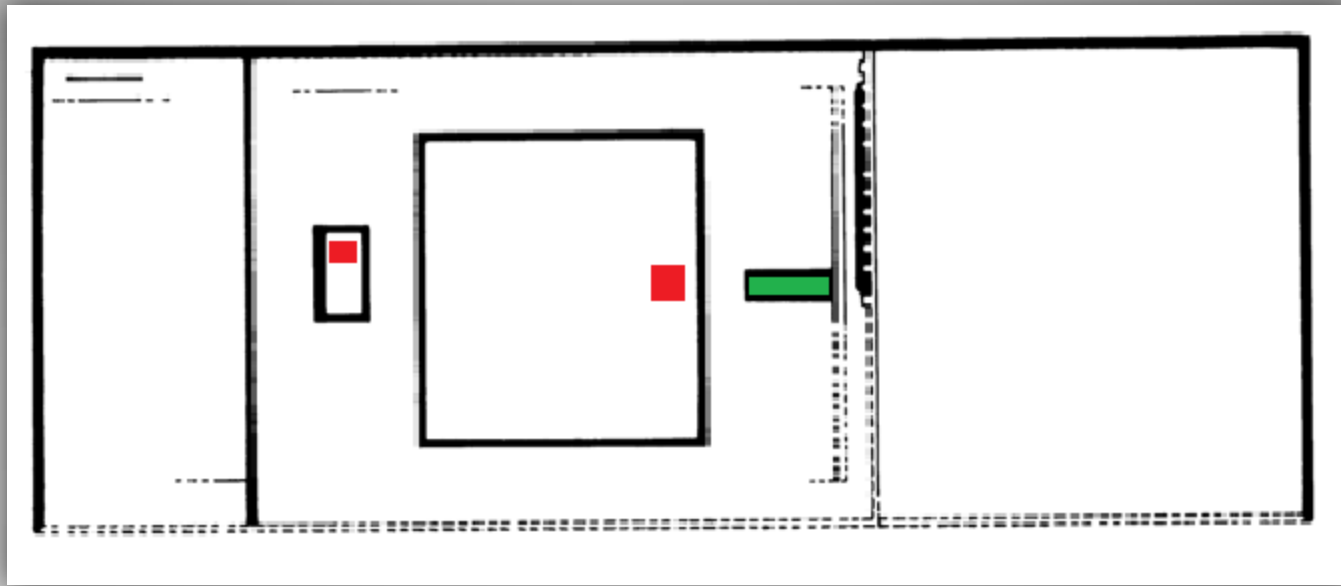
PLAN AND SECTION OF THE PYRAMID OF SEKHEMKHET



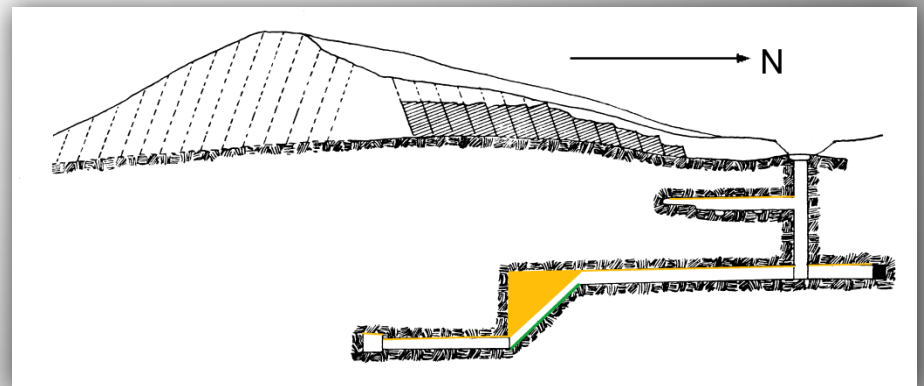
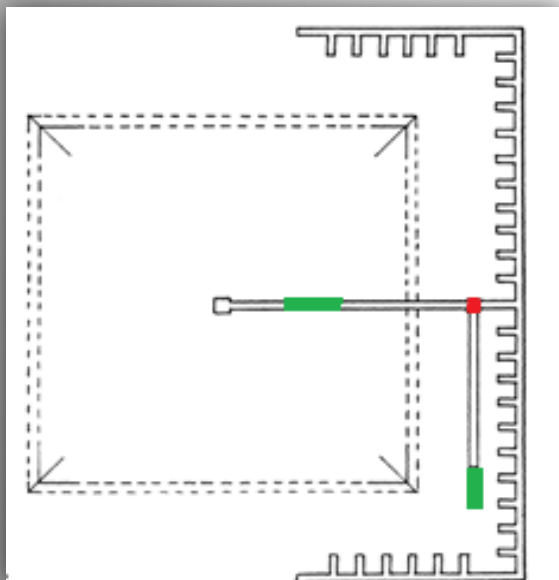
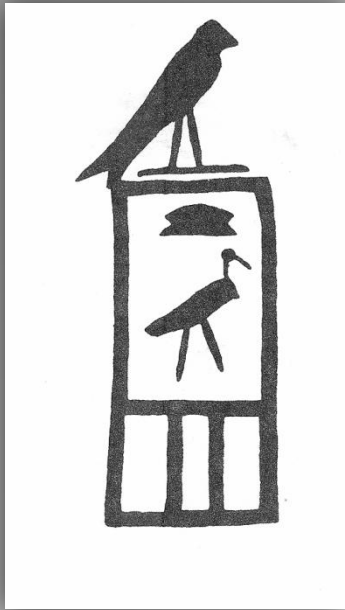
TUNNELLING BELOW SEKHEMKHET



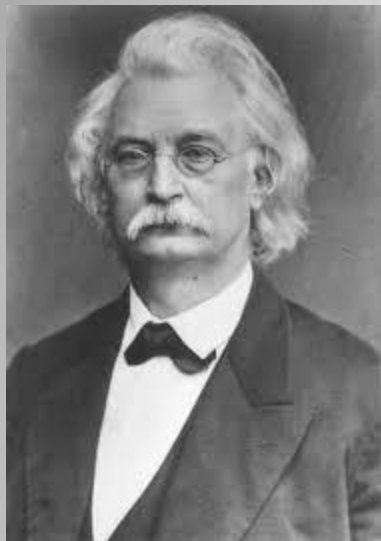
THE SOUTH TOMB OF SEKHEMKHET



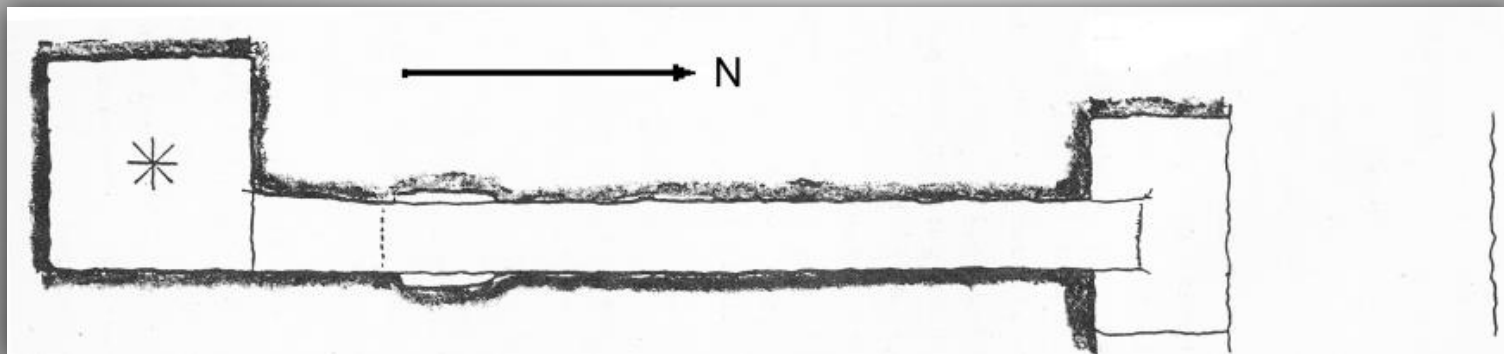
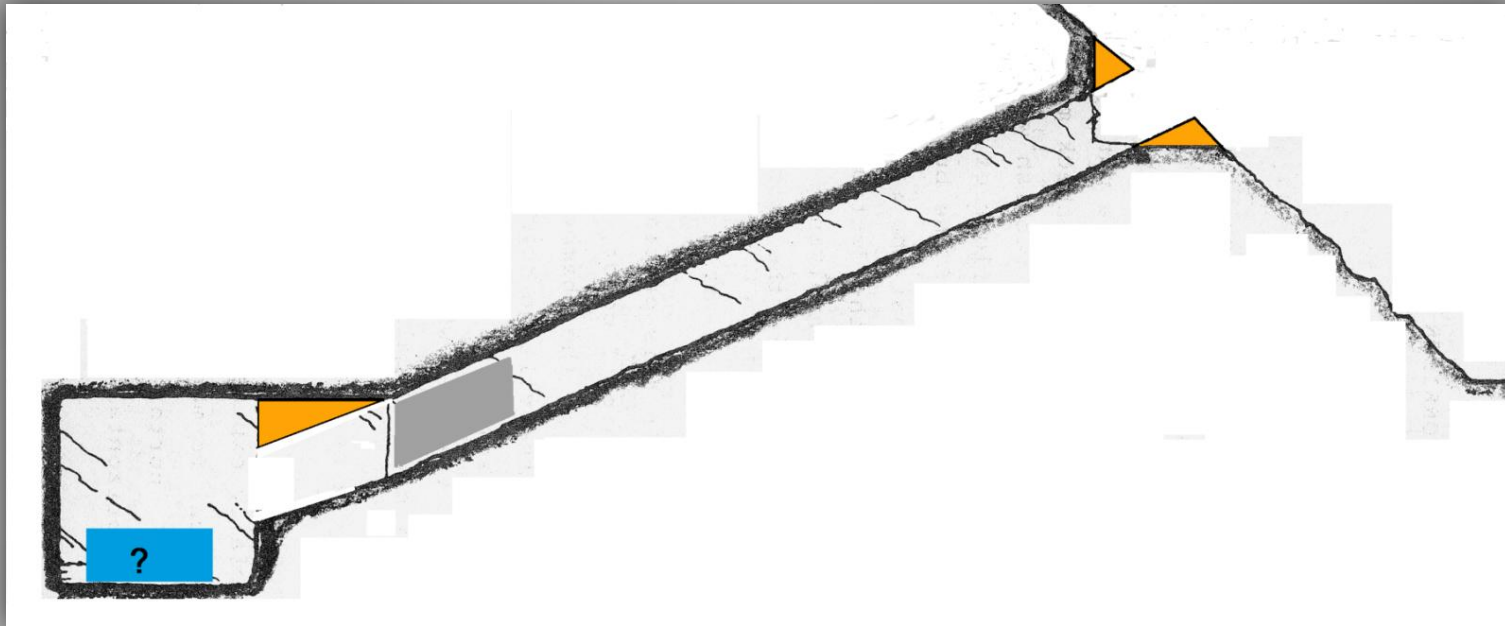
THE LAYER PYRAMID OF KHABA? AT ZAWYET EL ARYAN SOUTH



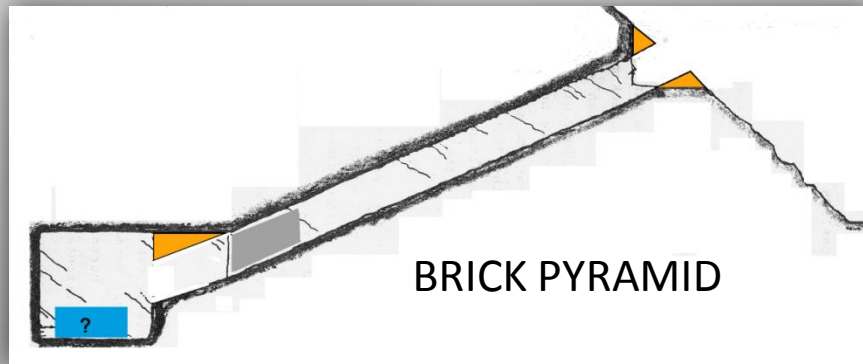
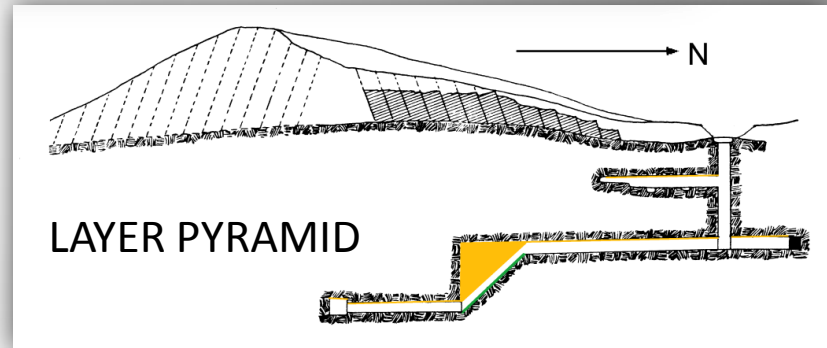
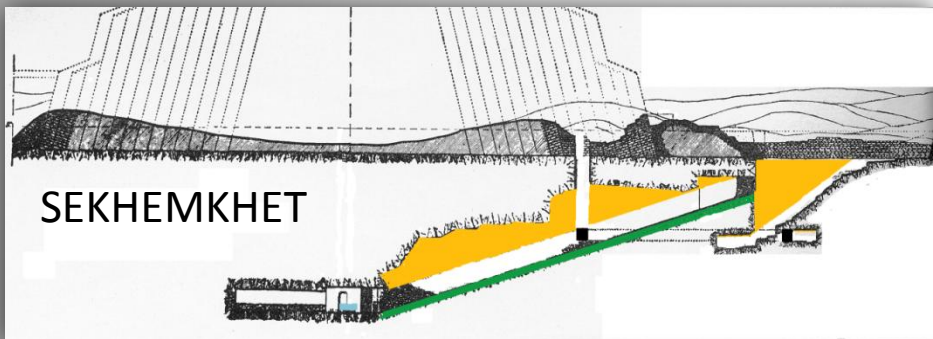
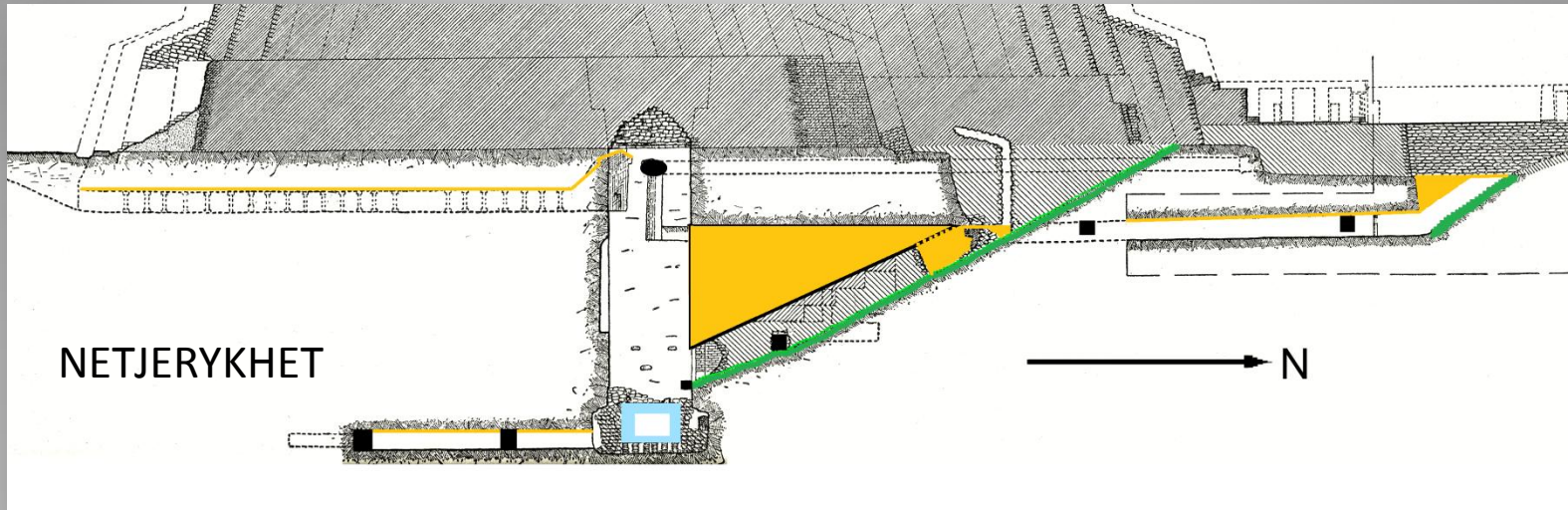
THE BRICK PYRAMID LEPSIUS 1 NEFERKA? OR HUNI?



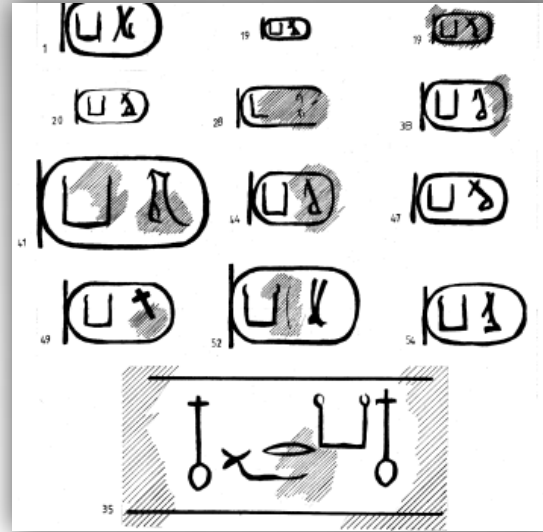
PLAN AND SECTION OF THE BRICK PYRAMID AT ABU RAWASH



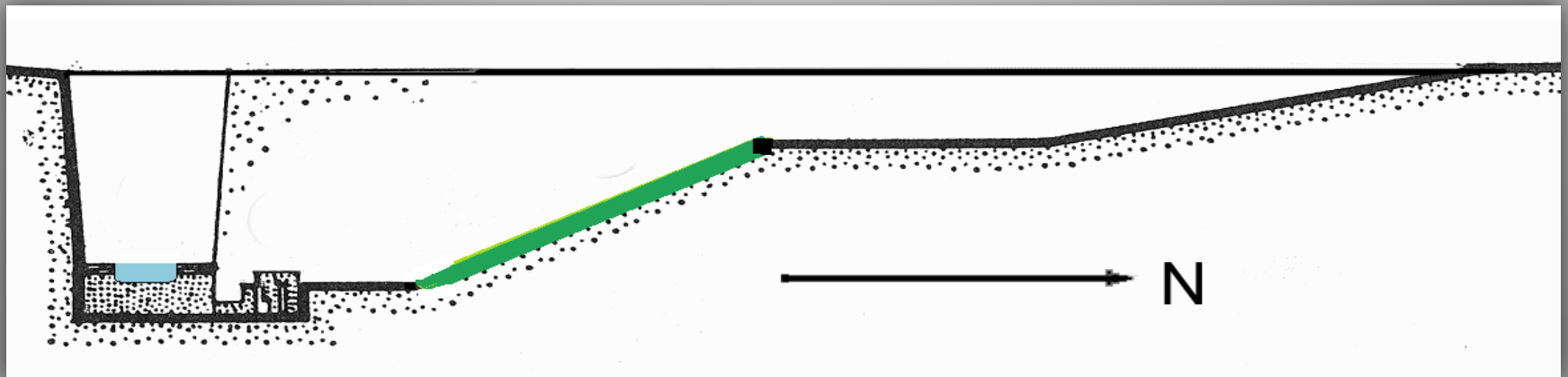
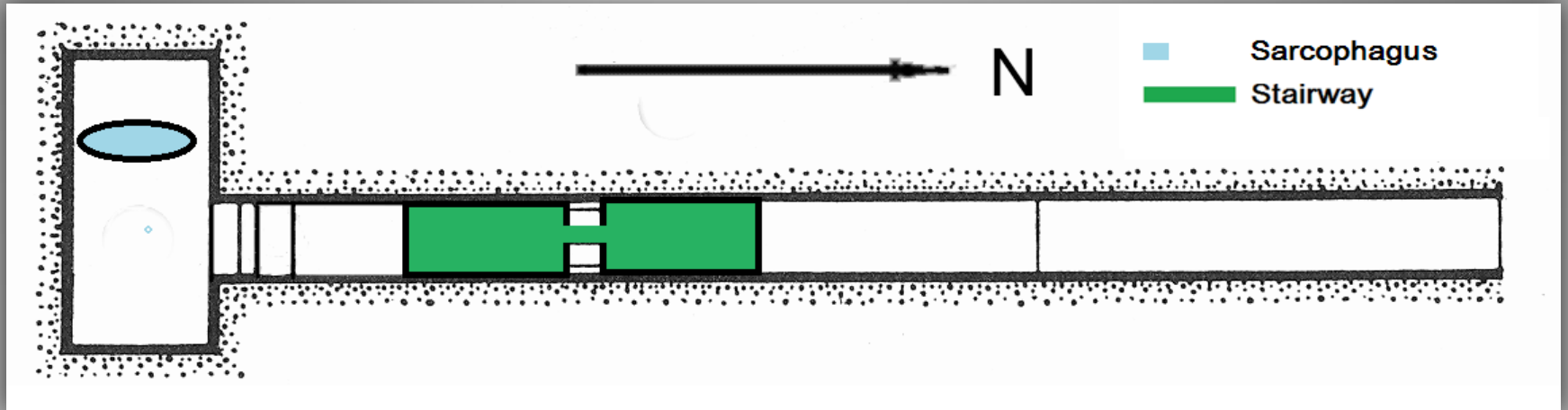
WHERE ROOFS COLLAPSED



THE UNFINISHED PYRAMID OF NEBKARA? AT ZAWYET EL ARYAN NORTH



PLAN AND SECTION OF THE UNFINISHED PYRAMID OF NEBKARA?



DIFFERENCES BETWEEN THE GREAT PITS OF NEBKARA? AND DJEDEFRA

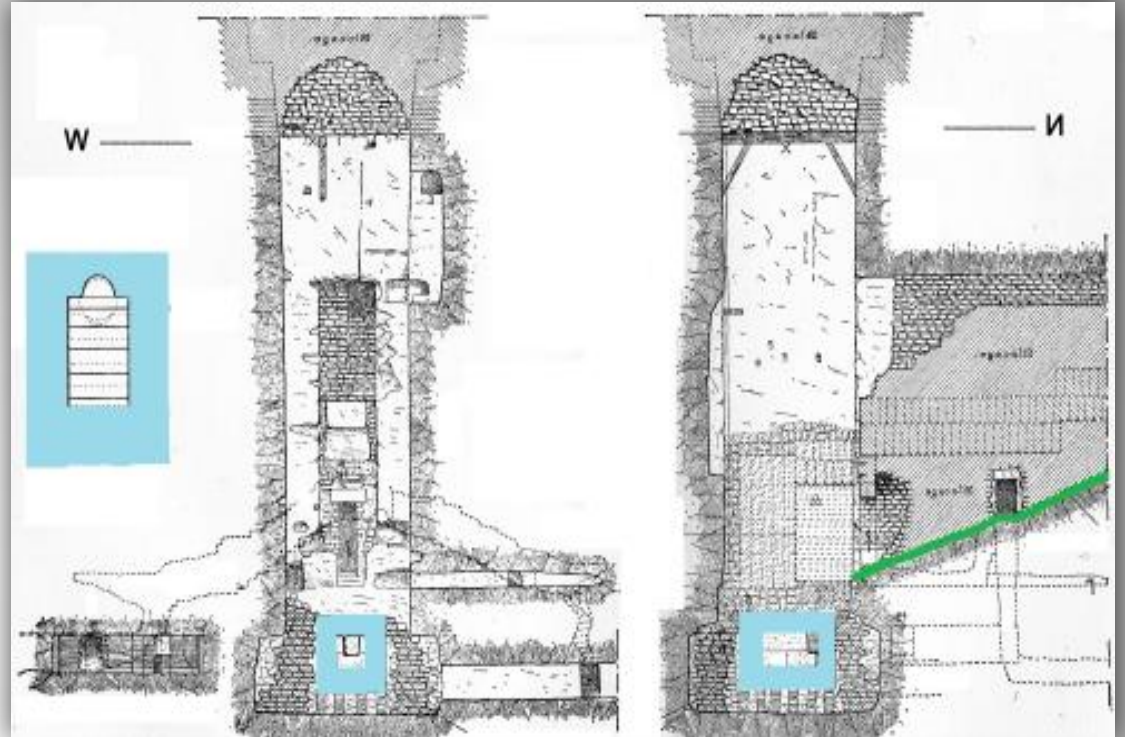


RAMP, PLATFORM, STAIRWAY, AND SHAFT FILLED THIRD DYNASTY STYLE GRANITE AND PRIMITIVE SARCOPHAGUS



ARCHITECTURAL CORRIDORS AND CHAMBERS OF LIMESTONE AND MOST PROBABLY A TRADITIONAL SARCOPHAGUS

FILLING SHAFTS



DESCENDING STAIRWAYS TO SUBTERRANEAN HYOGIA



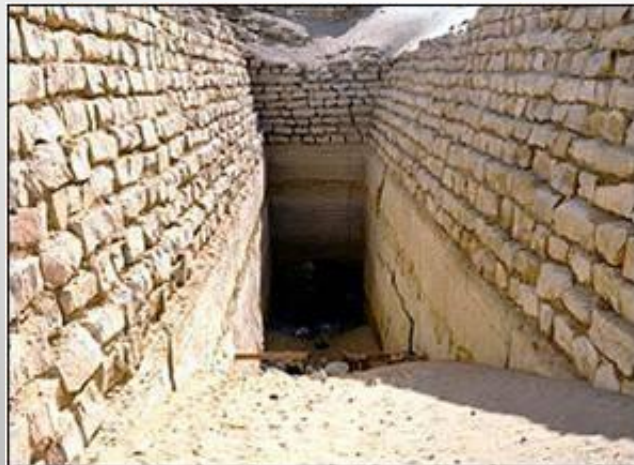
STEP PYRAMID NORTH



SOUTH TOMB



K1 EAST SIDE



SEKHEMKHET

FILLING DESCENDING STAIRWAYS



SOUTH TOMB



K1

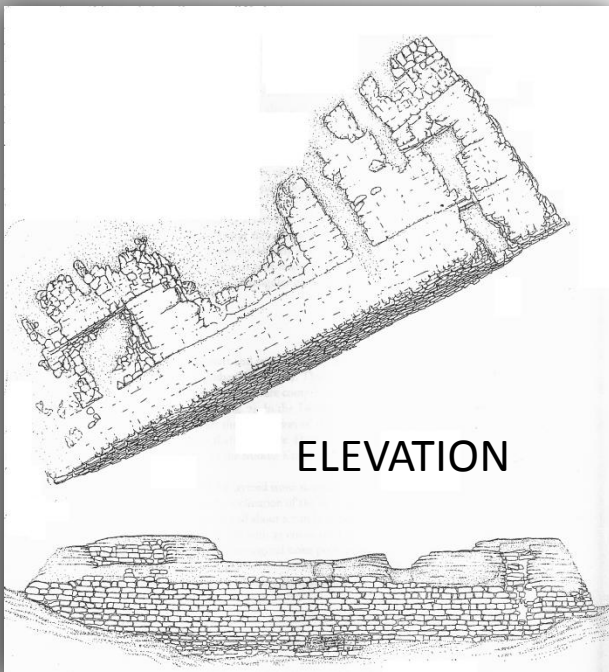
A SACRED HILLSIDE BUILDING AT NORTH WEST SAQQARA



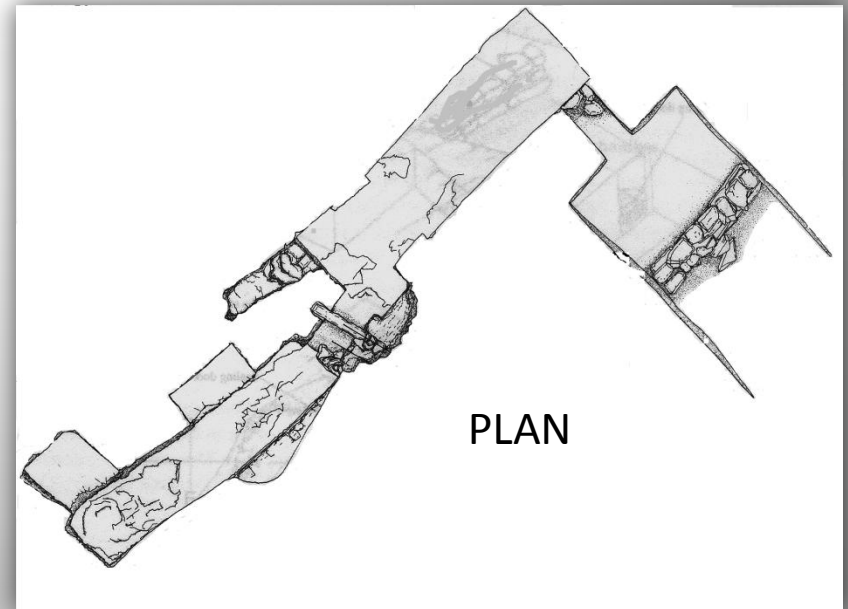
NOZOMU KAWAI



SAKUJI YOSHIMURA

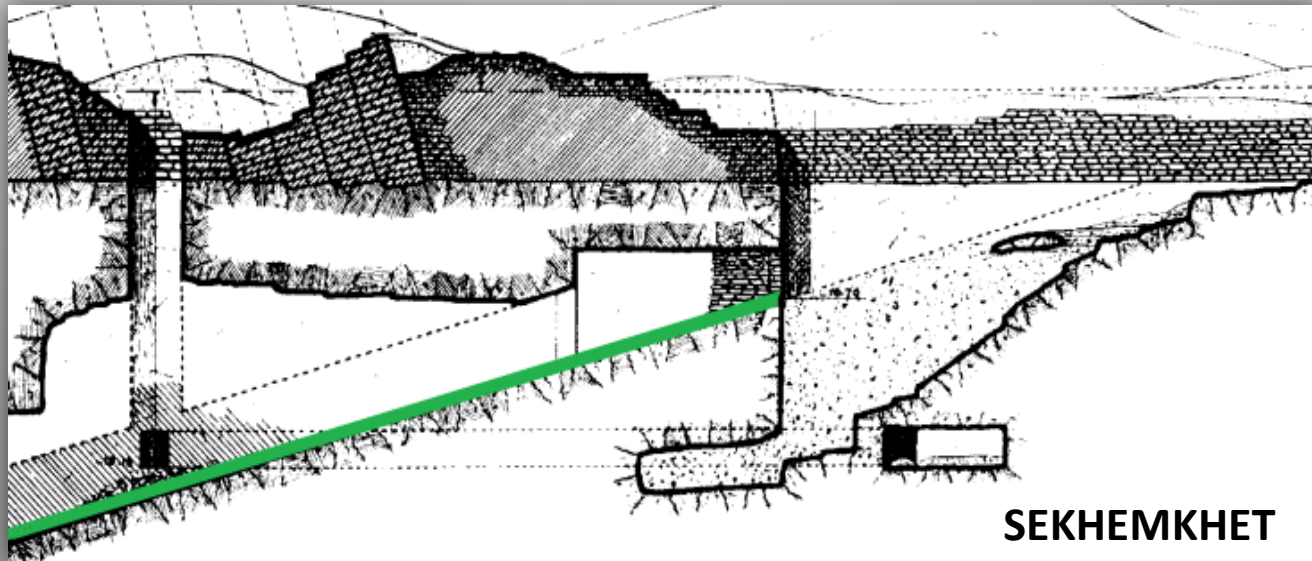
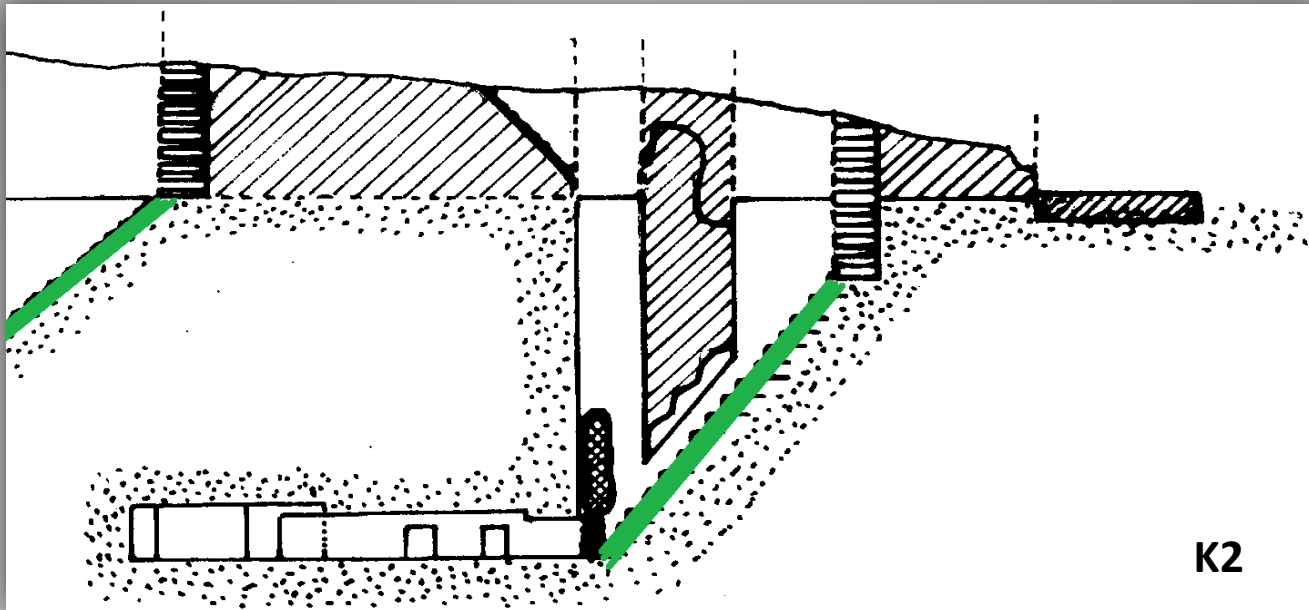


ELEVATION

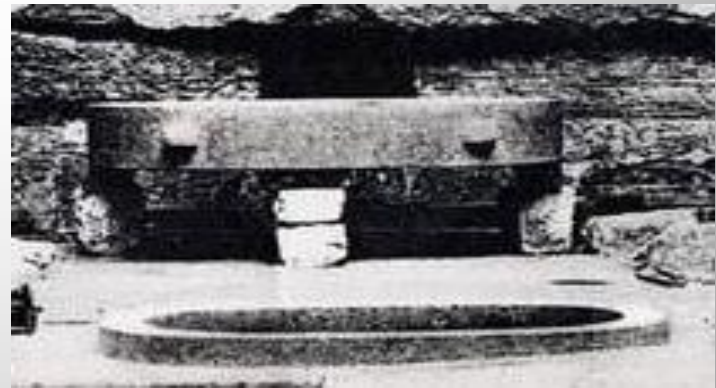
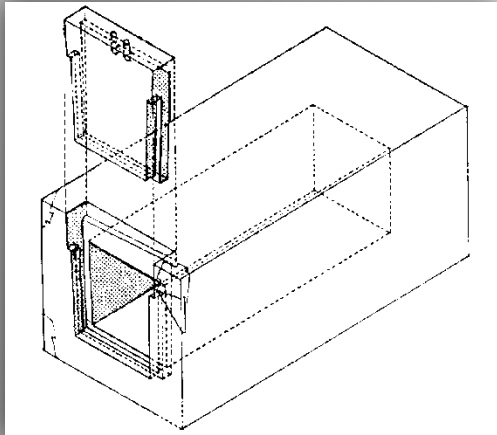


PLAN

INDEPENDENT SUBSTRUCTURES

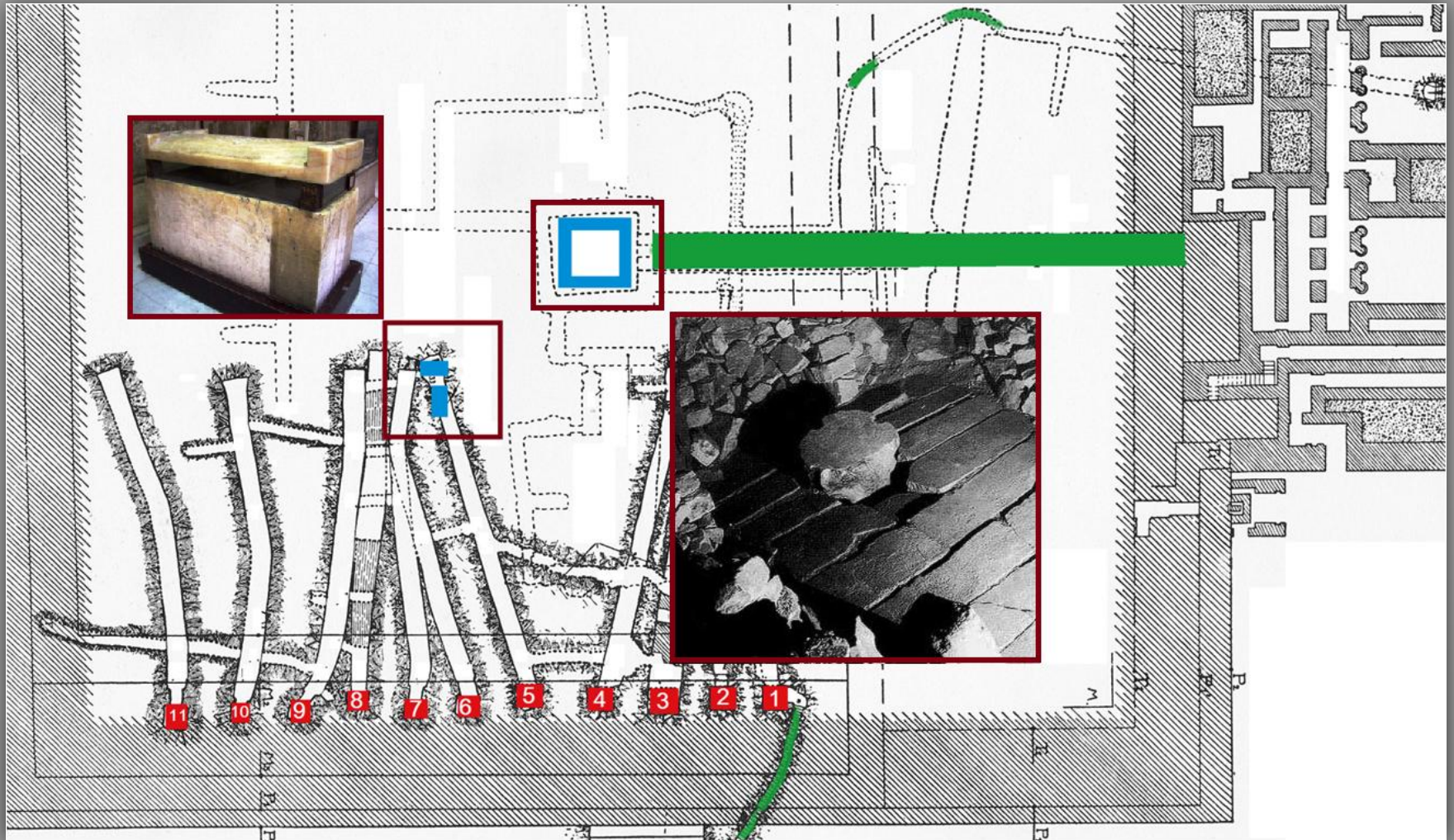


**ROYAL SARCOPHAGI HAD NOT REACHED THE CONVENTIONAL SHAPE
DURING: NETJERYKHET, SEKHEMKHET AND NEBKARA**



NO SARCOPAGI WERE FOUND BETWEEN NEBKARA AND KHUFU

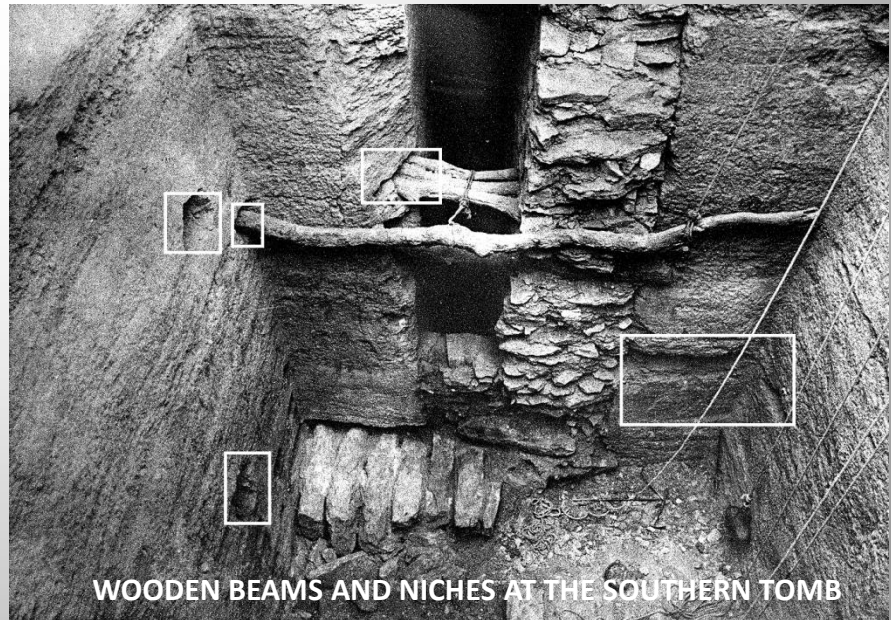
**PUZZLING ARE 2 SARCOPHAGI AT THE CORRIDOR OF SHAFT # 5
THEY ARE SIMILAR TO ONE FOUND AT DAHSHUR**



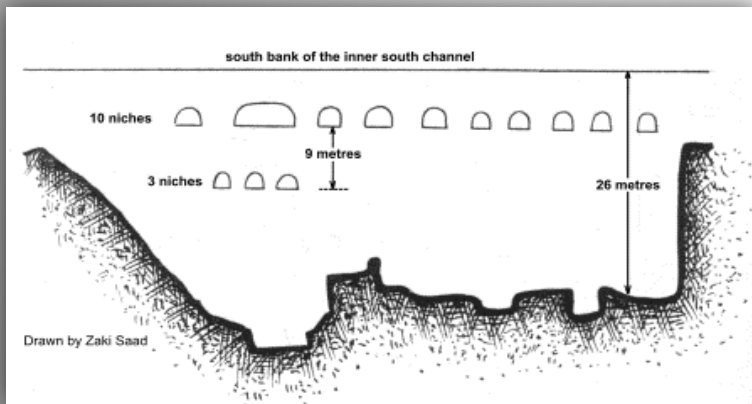
THE NICHE OF ZAKI SAAD OVER WEST COMPARTMENT



ZAKI SAAD



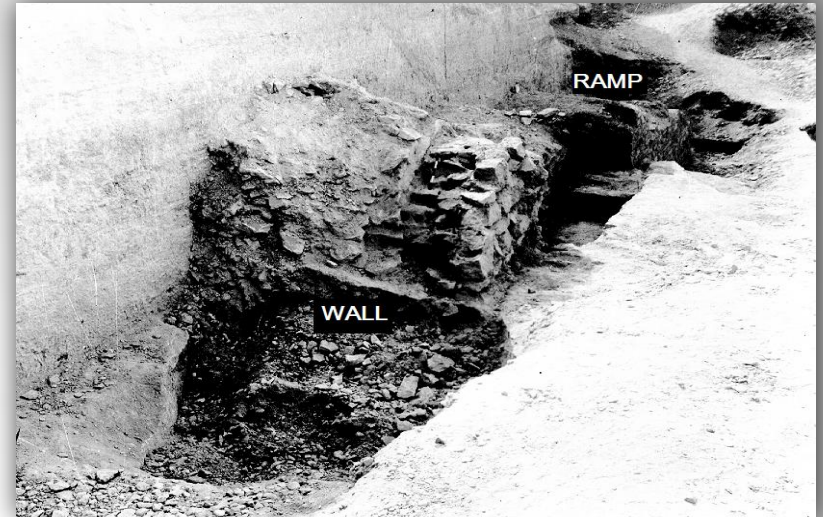
WOODEN BEAMS AND NICHE AT THE SOUTHERN TOMB



WALLS BUILT ALONG CORRIDORS



SHAFT OF THE SOUTH TOMB

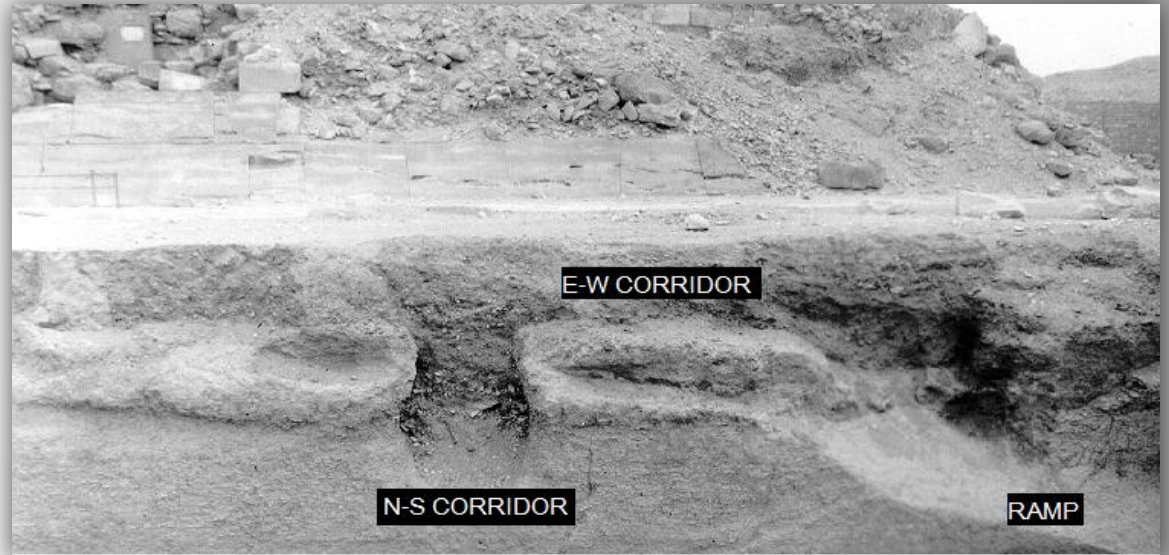
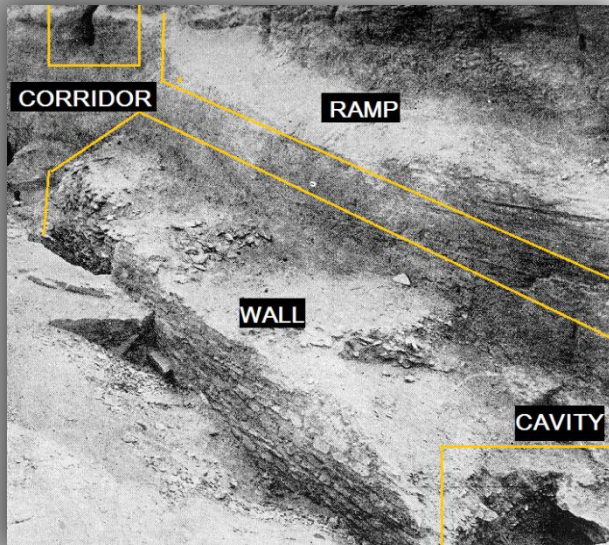


WEST AREA OF THE DRY MOAT



SEKHEMKHET

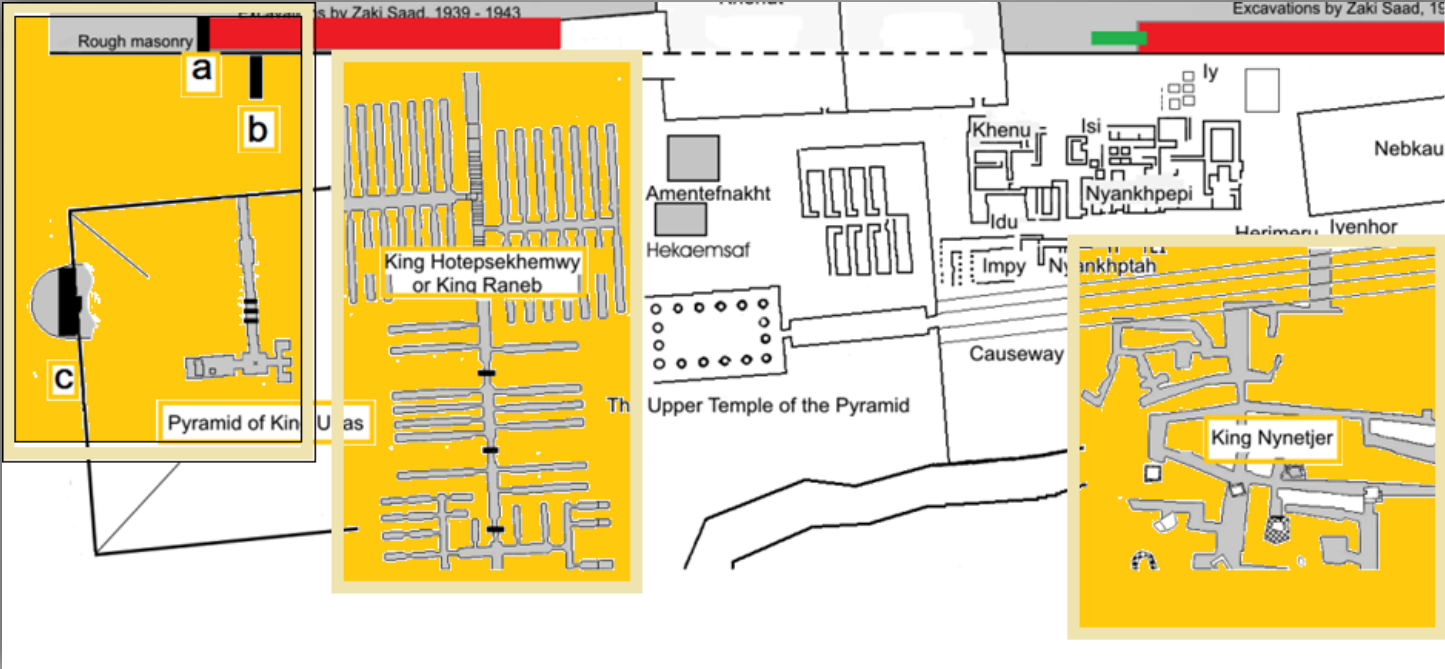
UNIDENTIFIED SUBSTRUCTURE OF A DEMOLISHED TOMB: THE SUBSTRUCTURE CUT THROUGH BY THE DRY MOAT THE SUPERSTRUCTURE REMOVED FOR THE PYRAMID OF UNAS



WEST COMPARTMENT BREAKS INTO A CORRIDOR

PIT FILLED FOR PYRAMID FOUNDATION

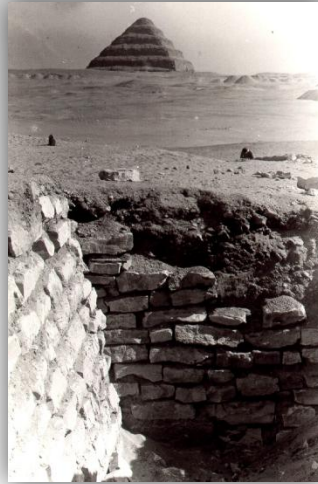
ROYAL TOMBS OF THE SECOND DYNASTY



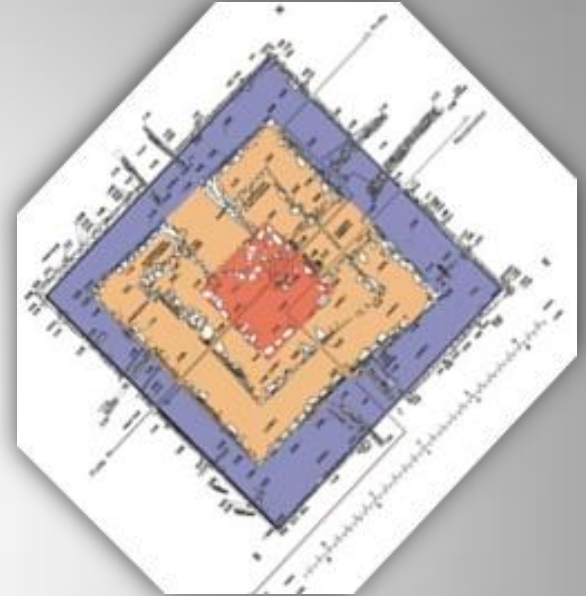
WITHOUT SUBSTRUCTURES: GISR EL MODIR AND THE MINOR STEP PYRAMIDS



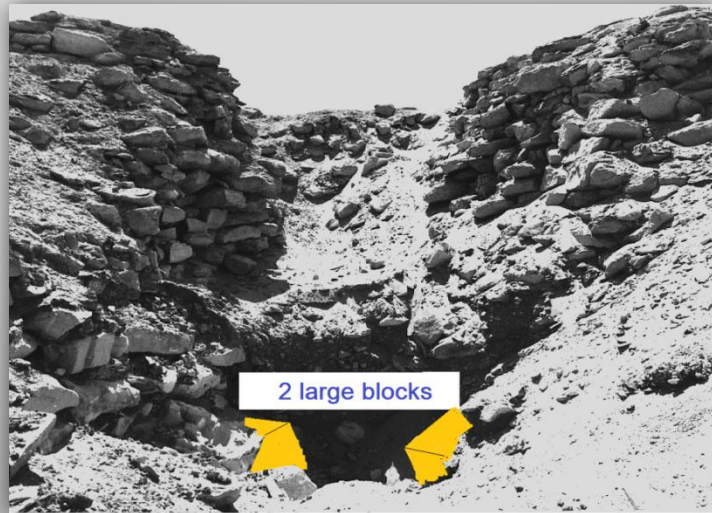
GISR EL MODIR



GISR EL MODIR

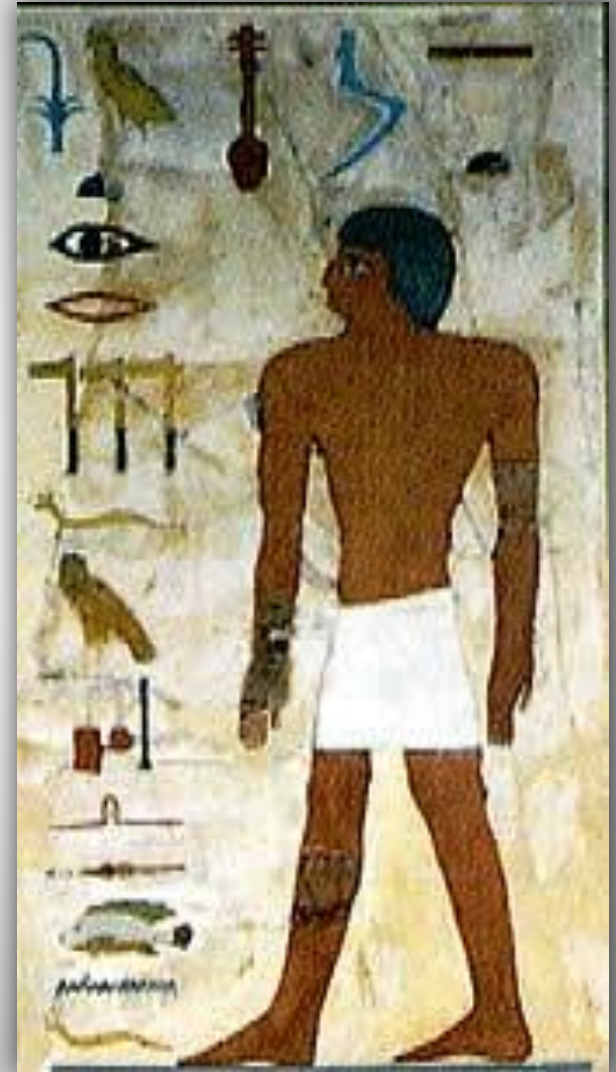
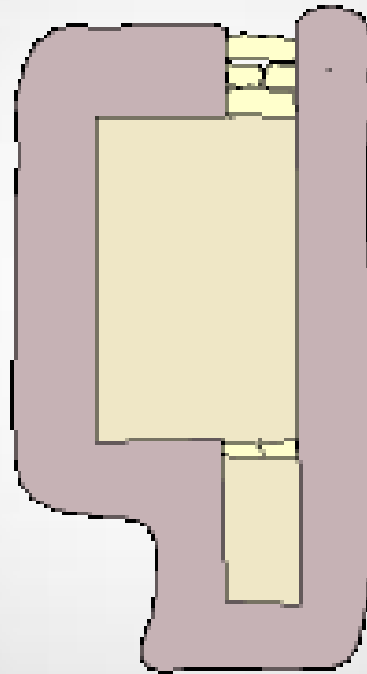
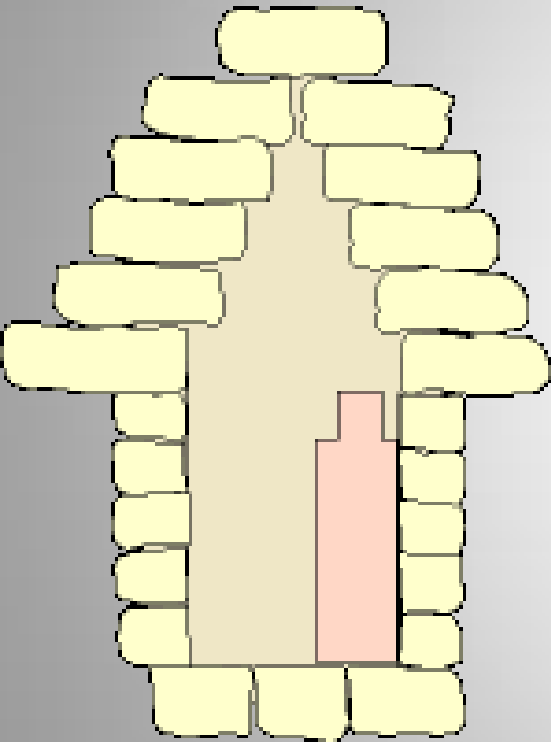


SINKI

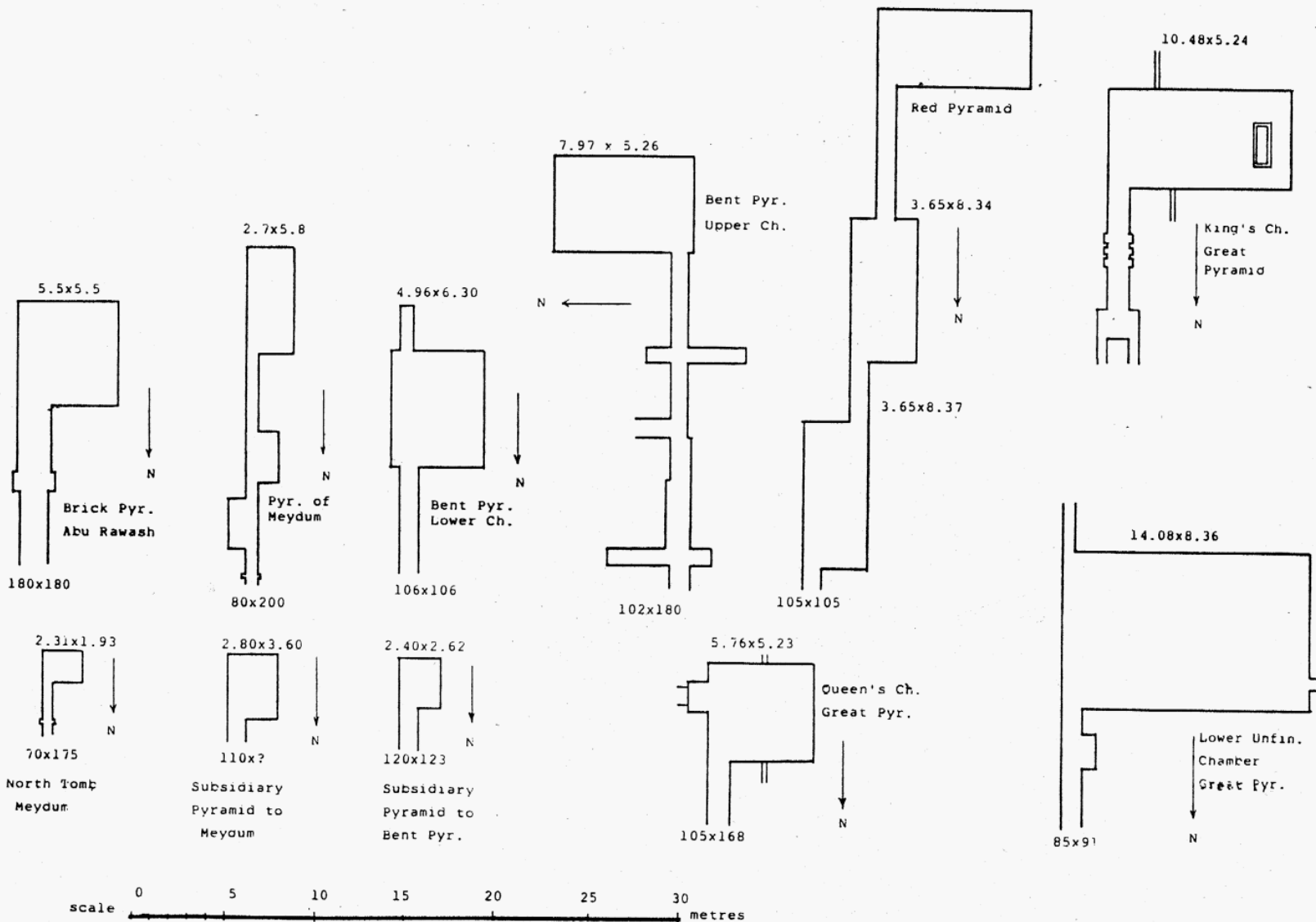


SEILA

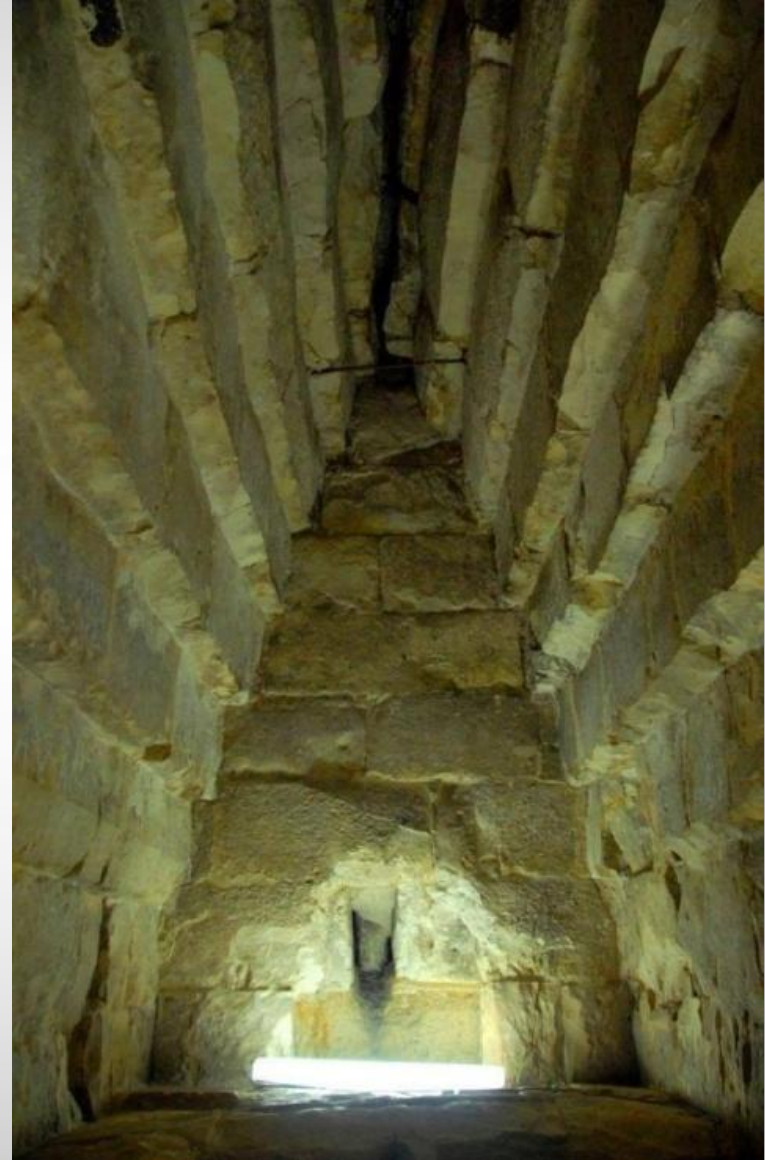
NEFERMAAT CORBELLED ROOFS



NEFERMAAT CHAMBER DESIGN



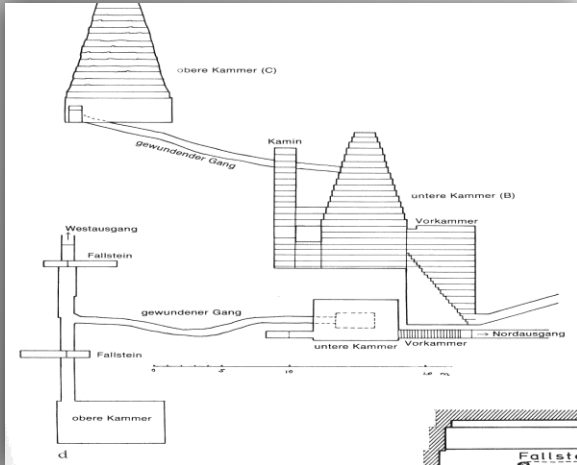
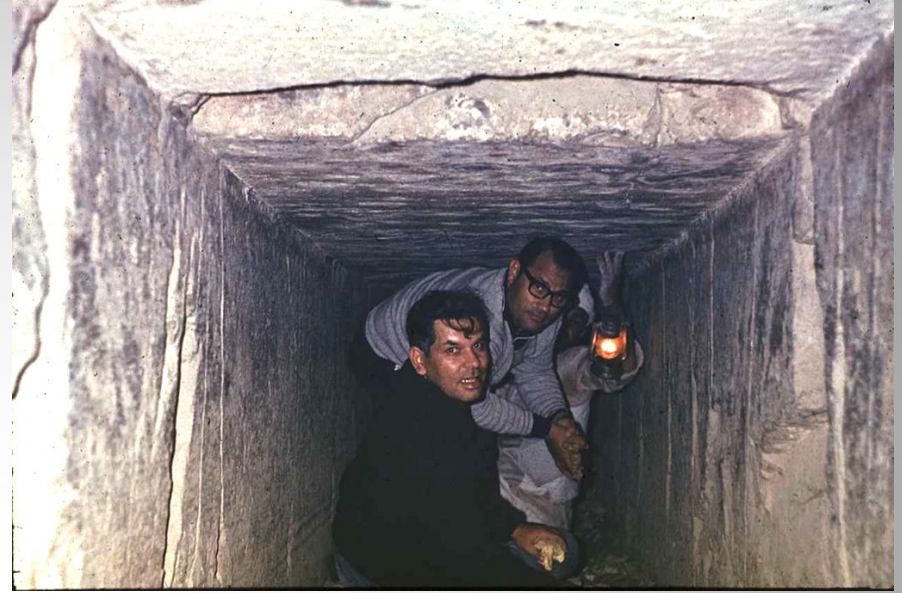
CORRIDORS AND CHAMBERS AT MEIDUM



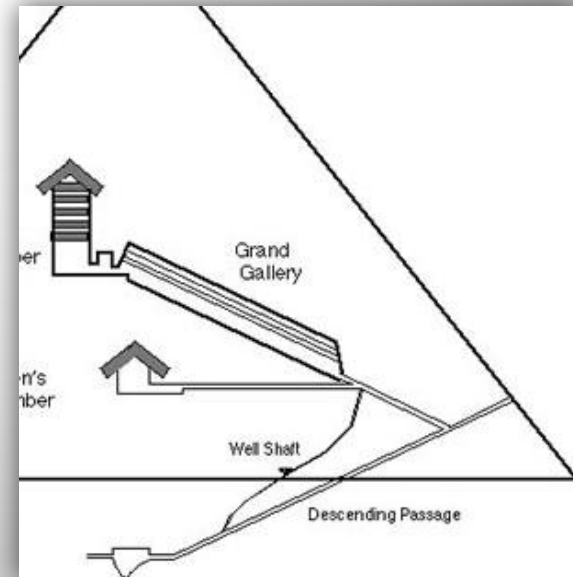
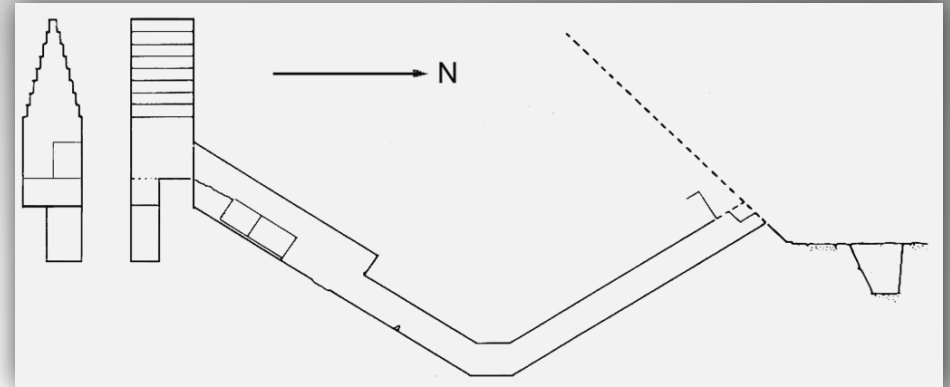
THE BENT PYRAMID



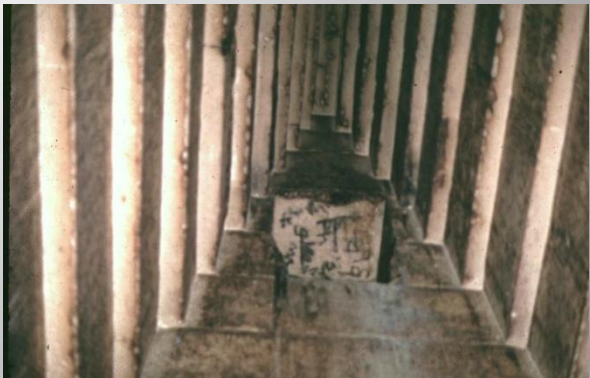
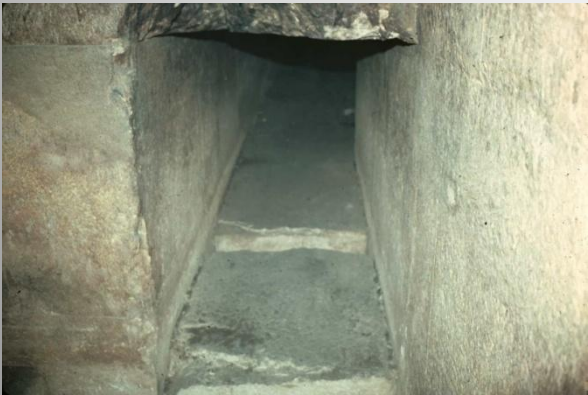
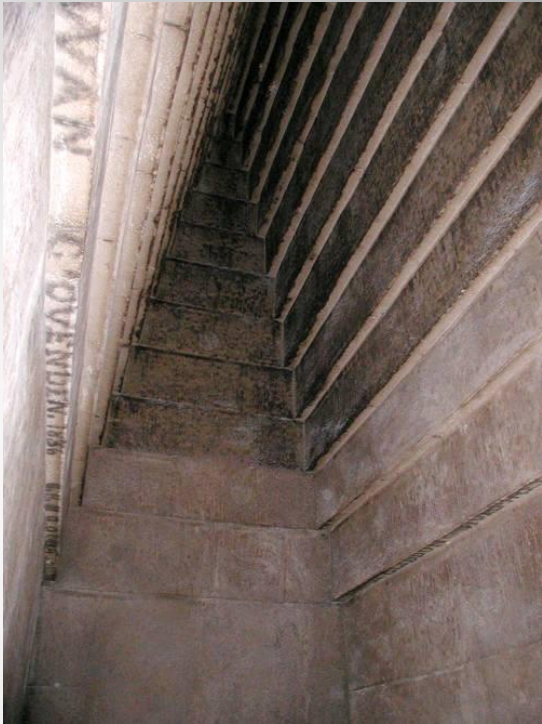
AHMED FAKHRY



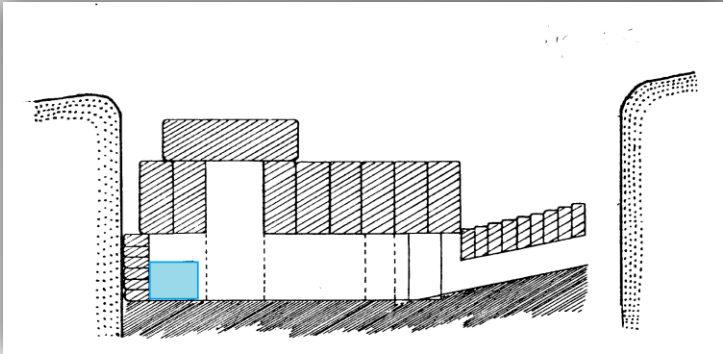
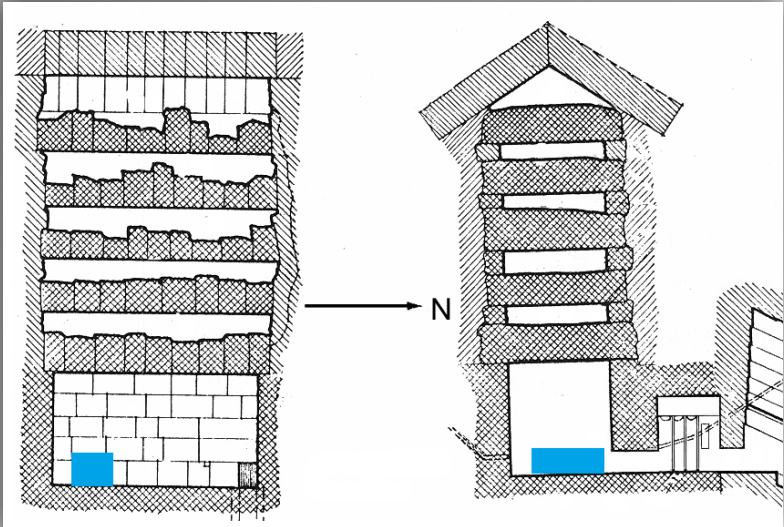
ASSENDING CORRIDORS AT THE BENT SUBSIDIARY AND KHUFU



THE RED PYRAMID



FLAT ROOFS APPEAR WITH CORBELLED AND GABLE ROOFS

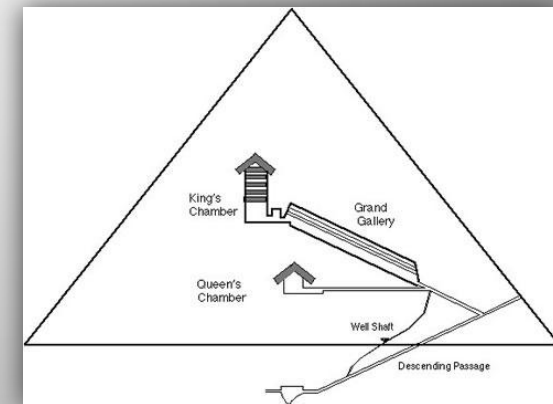
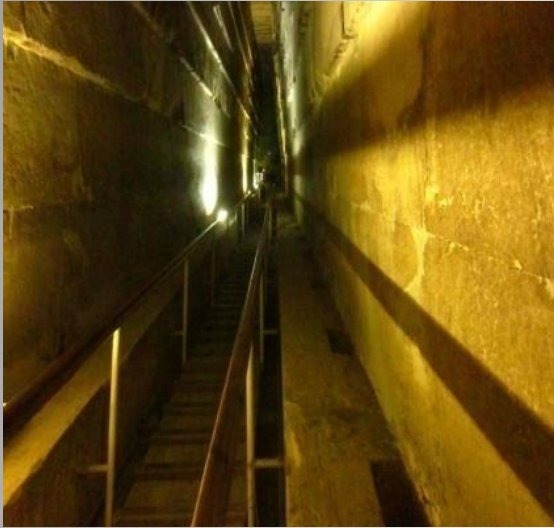


HEMIUNU THE CONTRACTOR OF THE GABLE ROOF



THE GREAT PYRAMID

WHERE TUNNELLING, ARCHITECTURES, CORBELLED, FLAT AND GABLE MEET

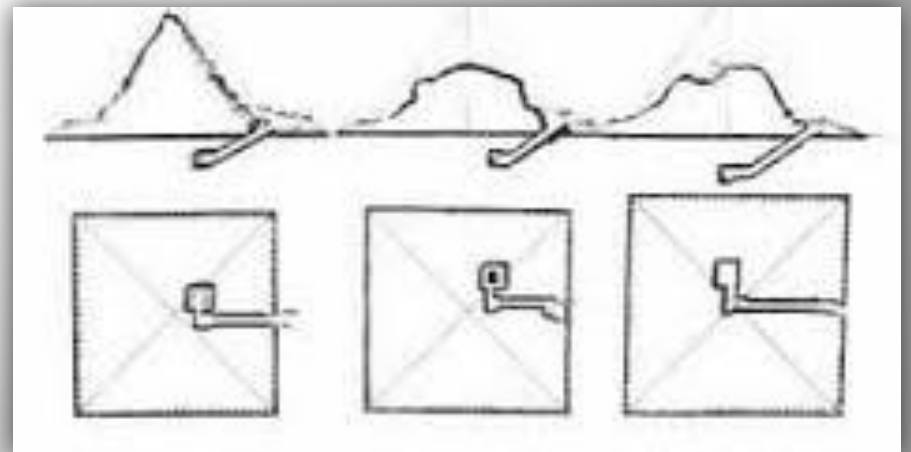
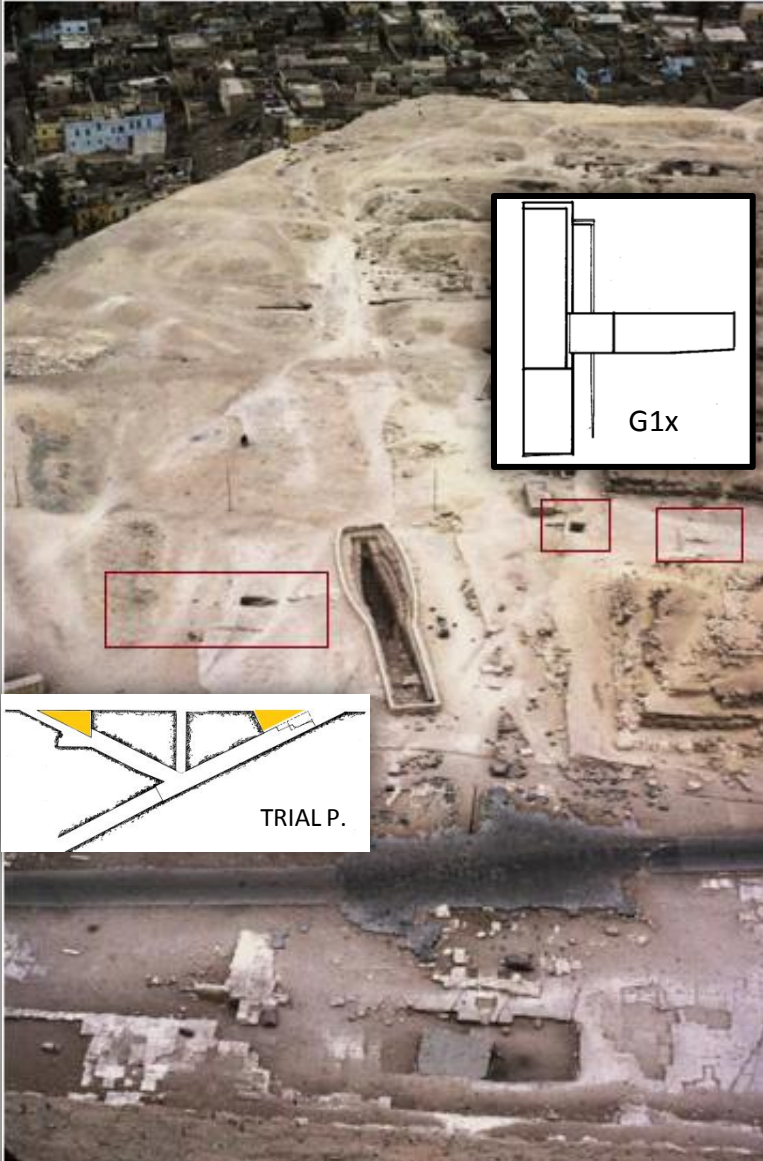


G1d

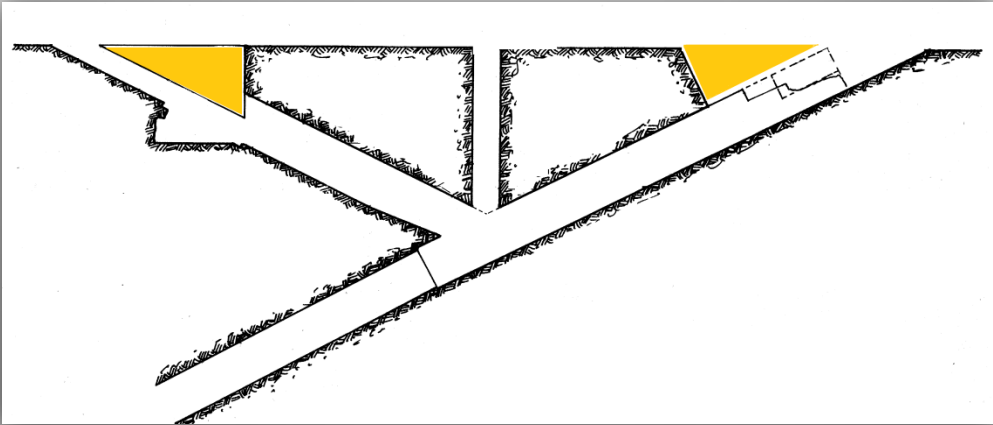
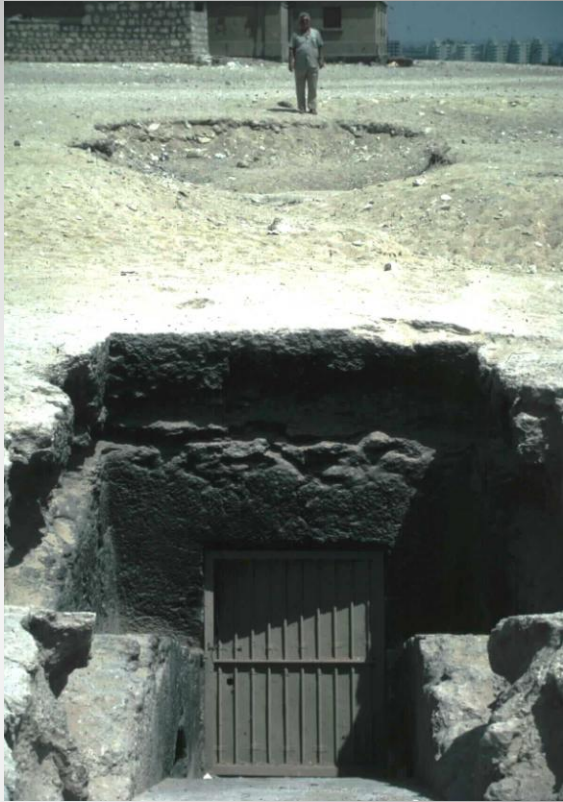


PREPEARED FOR A CORBELLED ROOF CHAMBER ?

EAST OF KHUFU



PETRIE'S TRIAL PASSAGES



BOAT PITS REAPPEAR WITH KHUFU



AHMED YOUSSEF



EPITOME

ANCIENT ACHIEVEMENTS

PITS

Were dug, lined with bricks and roofed with wood, matting and rubble.

TUNNELS

1. Were a success, with horizontal corridors; and vertical shafts?
2. Roofs collapsed over descending ramps and stairways.
3. Substructures began simple, expanded, shrank and partly disused at the end.

CONSTRUCTIONS

1. Stone blocks roofed narrow width areas.
2. Columns broadened stone roofs areas at the superstructures.
3. Corbel, flat and gable methods roofed broader areas without columns.

RESEARCH RESULTS

1. The greater part beneath the Temenos Area (5 km) was not investigated.
2. Geophysical identification of more tunnels was not verified.
3. The Dry Moat is 3.5 km; only 0.300 km was partly investigated.

FACTS REVEILED

1. Ancient contractors of the Dry Moat crushed through, two, earlier hypogeum.
2. The beginning of a descending stairway, a narrowing wall and niches for hitching platform beams at two levels.

EGYPTIANS LEARNT THAT AMBITION GAVE INTO WHAT COULD BE POSSIBLE