ARCHAIC TECHNICAL TRENDS AT THE BEGINNINGS OF ARCHITECTURE

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Summary

Examining the character of the evolution of early — prehistoric, Near-Eastern and Egyptian — architecture and comparing it to the trend of an archaic technique, the concept of generalization has been formulated. Its six stages — (instinctive) recognition, extreme trials, universal implements, specialized equipment, composite tools, survival — are also characteristic of early architecture, and universal tools seem to have early local architectural types, specialized ones, regional archictectural types as counterparts. The presented trend of generalization seems to be valid in other fields of research, too.

The analysis to be presented was part of a major research into factors of technique of, and approach to Near-East beginnings of monumental architecture. The concept and trend of generalization of practice to be outlined were disclosed by understanding the interaction between techniques, the operation and form transfers, requiring, in turn, to know the level of donor and acceptor techniques in the course of operation and form imitation. The current interpretation that the development had stages of evolution, upswing and decay, was inconvenient. Although the research concerned the early period of the history of architecture, in order to determine fundamental features of technical development, a non-architectural, though original "industrial career" had to be found that had no precedents, its development was unaffected by other effects, and was a practical domain perfectly extinct by now.

Such an ancestral, simple and original activity was the chipping of flintstone tools. This was the first technology having no precedence, a protohuman "invention", an almost unique, material concomitant to the evolution into Man. Its originality is obvious from the fact that surviving forms entirely refer to old times.

Australopithecines and Archanthropuses laid the foundations of human culture by having thrown or blown a pebble to another one, thus producing the first tools in the form of disrupted stone crumbles with sharp edges.

Initially, these primitive broken pebble and chipped tools were accidental in form, each piece different, thrown away after each use or attempt to use (Olduwa, Buda, Vértesszőllős). The next phase of development, still affecting

Archanthropuses, was to produce stone tools by ever more blows hence formation according to actual concepts, though these tools still had no established form, and utilization remained accidental as before (Peking).

Further on, the pebble core and the chipped spall were developed like two different but equally useful, refinable "products". Working and use as a tool of the core stone resulted in the first, primitively constant-shape handstones and clets (Abeville) and chip tools (Clacton). These rough or chipped stone implements were universal tools for blowing, cutting, thrusting and even boring, made for lasting use as tools or weapons.

The activity of the still higher developed Paleoanthropuses resulted in still better, definitely constant-shape, standard, improved core stone and chip technologies, in the cultures of Acheul (clets) and of Levallois (chips). Developed Neanderthal-type Neoanthropuses created the chip and clet cultures of Moustier, but then the universal clet was gradually displaced by special chip tools, blades, leaf tips and scrapers.

In the upper Paleolithics, Homo sapiens produced variegated sets of tools, composite tool forms by means of various blade technics. Spears, arrows were fitted with stone heads; the microliths (small blades) were set in bone or wooden handles to make knives, chisels or adzes.

With the advent of urban civilizations, metal tools perfectly displaced chipped stone implements from practical life, although they still long survived in religious sacrificial ceremonies (Asia Minor, Egypt, Bronze-Age Denmark, antique Rome, etc.). These sacrificial flint knives, ceremonial spears, etc. imitated the already developed metal tool forms.

How to recapitulate concisely the history of paleolithic stone industry?

Palaeoarchaeology having already periodicized it according to the above, let us add stages felt to be of relevance to the beginning and the end of development, such as:

1. stage of instinctive recognition;
2. stage of extreme trials;
3. stage of universal implements;
4. stage of specialized tools;
5. stage of composite tools;
6. stage of ideological survival.

These definitions formulated with a universal validity hint to the relevance of this line of development to other, ancestral techniques, in particular, to the development of bone carving, weaving, leather working, maybe of clothing. Rather than that, let us consider whether this trend may be applied to the development of architecture and of building technology, or not.

Beginnings and stages of development of house formation

The age to be considered lacked architecture, initially even building. However, space sensation and space demand, alpha and omega of architectural problems according to the actual approach, existed and so did natural space configurations instinctively qualified by early Hominides according to whether they looked safe or frightening to them.

Findspots show them to have included both confined and open sites. Findspots in Java refer to terraces in once river bends, those in South-Africa to abysses and rock shelters, just as Pekinese ones, while Vértesszőllős finds point to a terraced spring basin. In any case, abodes were protected by one or at most two natural "walls", with no care for cover but with a possibility to escape.

Hominides walking on the ground strove to expropriate natural refuges safe against wind from at least one direction, excessive sunshine, and attack from outside.

In the middle stage of the Paleolithic, our ancestors moved into caves, differing from earlier abodes by limited, generally smaller useful areas, by being dead-end in one direction, but a better refuge because of their natural vaults.

The highest developed Homo sapiens generations left caves. Being more creative, they soon found out how to make abodes. First, the cave opening was blocked or its foreground was made more accommodating, or else pent-house-like abodes were constructed by leaning a tree trunk to the rock shelf. Migrating, game tracking hunters invented primitive wind screens, a kind of wall made of earth, twigs, hides along a straight or curved line normally to the prevailing wind direction, shielding themselves and the fireplace. The first huts were built some twenty thousand years ago by reindeer hunters wandering in East-European steppes.

The practice of building earthen houses might develop in steppe regions of the Ukraine.

Let us have a look at the Near-East where climatic, zoogeographic and phytogeographic features have led to revolutionary events. Hunting tribes of the tenth millenium B.C. still lived in circular tents just as their European contemporaries. Harvesting people — achieving more than did those living by gathering — have built houses with walls and roofs for lasting use already in the ninth millennium B.C. Pre-Pottery Neolithic A houses of Jericho had floors recessed into the ground, walls built of roundish mud-bricks over a regular, round ground plan, downstairs and conic roofs. Some centuries later, the Pre-Pottery B level contained houses of a rectangular ground plan. In addition to these, early in the sixth millennium, houses with several rooms over a circular ground plan were standing in Khirokitia, Cyprus, and about at the

same time, the primitive agrarian people of Tell Abu el-Hureyra in Syria built houses with a square ground plan, with five rooms. It is obvious that farmers introducing the Neolithic revolution created the stage of extreme building trials in the history of housing.

The sixth millennium B.C. is — at least in the Near-East — the period of final conversion to food production. Peasant-villages appeared in the region between the Aegean Sea and the Hindu Kush, mostly sheltered by carefully constructed defensive walls. Houses with a practically square ground plan in Chatal Hüyük were built closely adjacent, with no doors. The entrance was across flat roofs via ladders. The symmetry of these typically one-cell rooms was enhanced by fire places and ovens mostly at the south wall.

Houses in layer VI of the Hacilar had meter-thick adobe walls and a single square room. Fireplaces and ovens were always at the wall opposite to the entrance. The sides of these rather big rooms were separated as recesses. In layer IIA, houses leaning to the defensive wall had at least two rooms.

Houses from the sixth millennium B.C. in Jeitun — sited in what is actually Turkmenistan — stood on a sandhill, rather haphazardly. Ovens were in the middle of the north or east walls of houses with a square ground plan, joined by a granary to the left, and the entrance. Several similar settlement- and house-forms have been found nearby, in the Neolithic findspots of Chagilli-depe and Pesejik-depe.

Thereafter, in peasant villages sited in valleys of northern tributaries of the two large rivers in Mesopotamia, the great economical, social and cultural reorganization took place that has led to the urban revolution in the fourth millennium B.C. Layer I of Tell es-Sawwan showed a type of houses with several rooms over a rectangular ground plan, followed in layer III by typical T-shape plans matured to local type.

In the fourth millennium B.C., rural communities in Mesopotamia were replaced by townships.

Tepe Gawra was still a transitory settlement, the township no real city-state. By the end of the fifth millennium B.C. the primitive house was represented by a circular hut with mud walls. The next layer exhibited rectangular, many-roomed houses. These houses were more or less detached, but the settlement grew crowded during the subsequent centuries. In the ninth layer from the late fourth millennium, the interlacing basement walls show a haphazard bulk of small rooms, so that separate housing units and passages are hardly distinctible. Curiously, the developed production and social cooperation resulted in a rather confused settlement structure.

An example for the complete lack of types fitting urban environment is layer A in Tal-i-Bakun.

The likely process of growing into a town might have begun by initially building detached houses, maybe regional types from the village community,

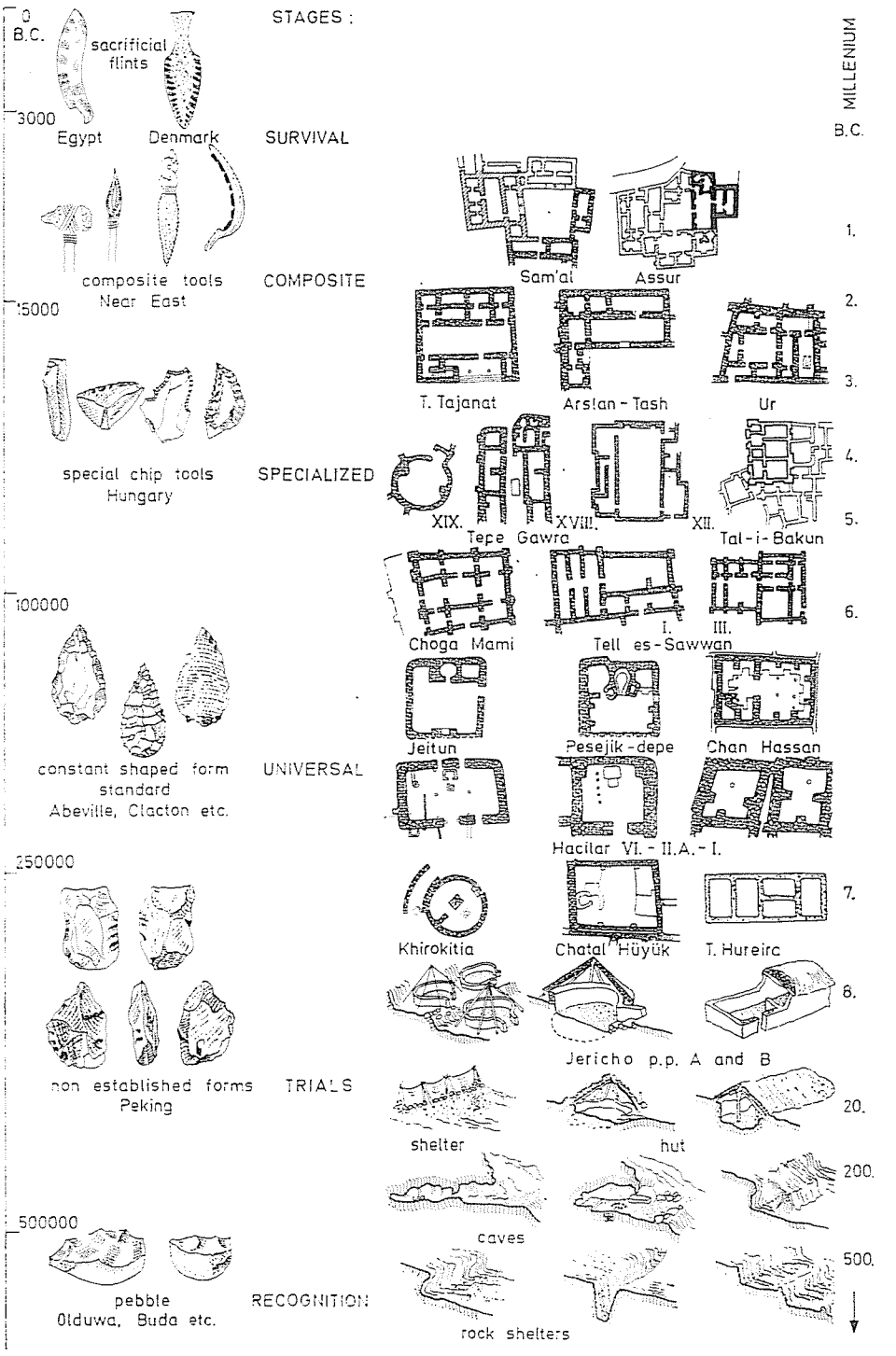

Fig. 1. Generalization of flintstone tools and house development

or such imposed by the then developing situation. With the increase of population, gaps between detached houses were built in at random, with shabby houses of the poorer, subordinate population. With the dilapidation of first-generation houses, in conformity with the social turnover, also the town grew or devoured its houses, gaps, passages like a living tissue.

After some centuries, the Mesopotamian town developed its house type. In Sumer, mid-courtyard, 'patio houses' (Esnunna, Ur) and in the north, more extended, two-courtyarded ones (bab-anu, bit-anu) developed as well, accommodating to the urban fabric. Fitting of the mid-courtyard house was due to the possibility to join adjacent houses with three walls, only the fourth side or the entrance itself had to be accessible from the street.

In fact, these were the first special living houses in history. By the second half of the second millennium B.C., civilizations in the Mesopotamian region developed their regional house types in wider, mountain settlements, comprising exclusively detached, single-mass types. Hurrite houses are e.g. of a transversal layout. Only palace varieties of this type are known (bit hilani) (Sam'al, Tell Halaf, etc.). Assyrians had similar houses, porches were replaced by a more closed reception parvis, the building itself was asymmetric. A peculiarity is a bathing house and a small livan on one side of the façade.

Individual and regional house types of various ethnic groups fitting into the system of Mesopotamian towns became components of more pretentious palaces and town houses, a phenomenon illustrated by the palace of the Sam'al citadel, the Sankherib palace in Niniveh, or the Red House in Assur. Centering two or three bit hilani or Assyrian houses on a central courtyard produced composite house types. Their development had the Babylonian patio-house as prototype, as also composite varieties became patio-houses.

In knowledge of the precedents and Near-East history of the "house", tendencies in the "stone industry" and the development of housing may be compared:

1. The development of building practice also had a stage of "instinctive recognition", namely, expropriation, followed by a partial transformation of natural configurations, such as river walls, shelters, caves — a stage extending over almost all the Paleolithic.

2. The age of "extreme trials" in the prehistory of building involves the end of the Paleolithic, Mezolithic and precedents of the Neolithic.

3. Appearance of a "local type" in housing, as a counterpart to a "universal standard", is peculiar to relatively homogeneous economic and cultural surroundings. One of its characteristics is the single space of uniform orientation, form and equipment. Later the ground plan, hence the function, involved space division and space arrangement but even multiroom types preserved the unity of the floor plan system. Universality resulted from having accommodated and fitting to each other both profane and cultic functions.

4. Under the conditions of urban revolution, a new, regional type corresponding to the "special standard" has developed. Its special character was due to self-contained living functions, and type marks were the apparent ground plan characteristics (middle courtyard, transversal system, porch, etc.).

5. With the increase of demands for quantity and quality, the interaction of regional types produced composite house and palace varieties. Their compositeness in the East mostly consisted of being arranged around a middle courtyard.

What about the "ideological survival" deduced from Paleolithic phenomena? The most ancestral example was abandoning the cave for living there but accommodating sanctuaries in the cave, sites of hunter magic, initiation ceremonies or cultic acts. Cave sanctuaries or cultic places were known in Antiquity, let alone Greek seats of oracle (Delphoi, Cumae, etc.) and in Roman times, buildings designed on a cave pattern were frequent (Mithras sanctuaries, Nymphaeums, etc.). With some "delay", arbours, huts, felt tents reappear in Jewish, Christian and Islamic religious ceremonies. In Hindoo cultic life, initially no other building but huts existed.

Arise and stages of development of cultic buildings

The evolution of monumental architecture was partly due to the rise of cultic actions and functions concerning extraterrestrial regions, imposing extraordinary tasks on construction expected to meet multidimensional demands so to provide for material frames of the cult. So, too, the evolution of cultic shrines, the development of their construction followed the path of the concept of generalized practice.

Let us have a look at the Mesopotamian trend of temple development.

The best examples of trials for a new building form were disclosed in Eridu. According to archaeological chronology, about 3000 years of trials may be tacked here, each shrine being superposed on an other, in search of a building form suiting the cult. In layer XVII, a simple, square building most likely protected the cultic object and accommodated a simple sacrificial ceremony.

A building in layer VIII relying on former trials pointed to the proto-Sumerian nave temple type several centuries later. The main cultic space was arranged about an axis from the cultic object to the altar, with rows of bilateral side rooms.

Two temples of the late Obeid age in layers VII and VI have further developed the type-marks for a much more definite floor plan layout, more exact wall stripe brick masonry and increasing dimensions. An important modification was to build these temples on a raised substructure, podium, a development pointing toward the terrace temple.

Temples in layers V to I were erected on ever bigger terraces. The last

terrace was a rather extended structure supporting a simplified, classic form of proto-Sumerian nave temples.

At that time, however, in layers VI to IV of Uruk, in the Eanna sanctuary area, originally new building endeavours and trials manifested themselves, relying — rather than on traditions e.g. Eridu precedents — on innovation at any cost.

A few centuries later, local types: oval terrace temples (Hafaji, El Obeid) emerged.

By the end of the third millennium, Sumerian restauration brought about the well-known cultic construction; temple tower or ziggurat.

At the top of the crest of a sequence of Eridu temples was the ziggurat, of the same layout as its counterparts in Ur and in Nippur. Further improvement was made possible by the then humble earthly temples, counterparts of celestial temples, corresponding to the dualism of Sumerian ideology. At the same time, the central, middle-courtyard temple type developed — maybe from an Esnunna house-type — into a Sumerian regional type.

Creation of the composite variety of the Mesopotamian temple has become possible and was quite natural for Assyrian architecture. The temple of Kar Tukulti-Ninurta was the most perfect expression of the central twoness of space and mass, by building, instead of the Sumerian ziggurat of a rectangular ground plan, a square temple tower beside the middle-courtyard earthly temple.

Individual temples (Nin-Mah) in Chaldean Babylon were composite varieties of middle-courtyard and nave types. In the shrine district of Esagila, there was the celestial temple, the Tower of Babel of Assyrian superstructure on a Sumerian terrace, and the earthly temple of Marduk, in separate quarters each.

Let us note that the development of the temple tower, as an independent structure, can be demonstrated in the foregoing. The tentative period may be assigned to podium temples of the late Obeid age, the first local type being represented by terrace temples of the earlier Sumerian age where the Sumerian ziggurat is a special, regional type, paralleled by that of the Assyrians, and obviously, the Tower of Babel is a composite type.

Let us attempt now to describe the development of Egyptian cultic architecture as a trend of the generalization process. Let us take the pyramid as our first example, for the sake of simplicity without its accessories the valley temple and the mortuary temple. The development can be well followed from the stone mound marking the grave of the deceased to the mastaba construction on the ground, called, according to our concepts, the stage of recognition. The stage from the mastaba to the stepped mastaba of Zoser in Saqqara is the architectural achievement of dynasties 2 and 3. The stepped mastaba on a rectangular ground plan gave rise to "stepped pyramids" over a square ground plan. The pyramid of Sekhemkhet in Sakkara, the pyramids of Khaba

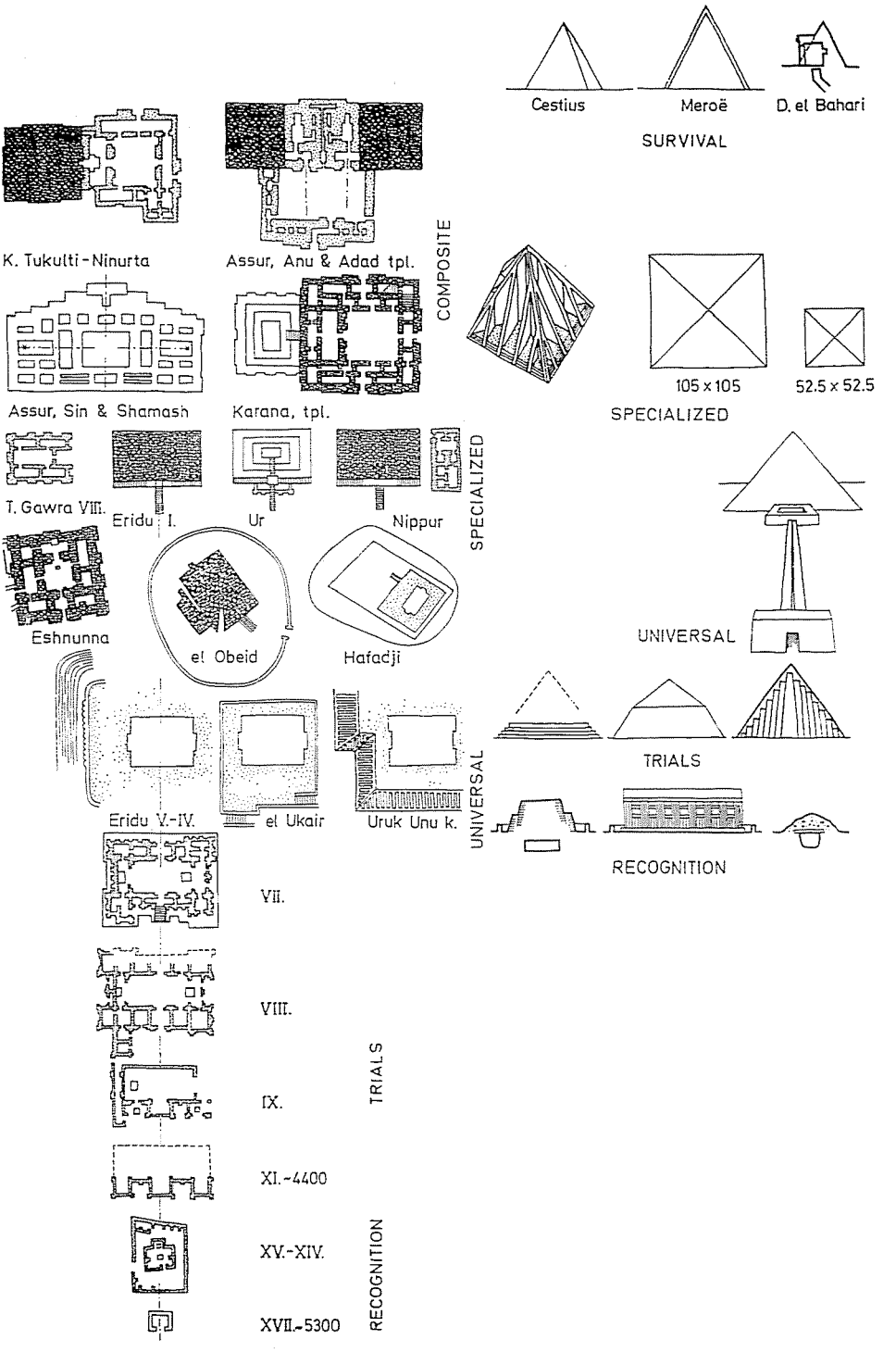

Fig. 2. Generalization of Mesopotamian temples and Egyptian pyramids

and Nemka in Zaviet el Aryan and other four dilapidated stepped pyramids of the third dynasty show attempts at this possibility. Such trials comprised the pyramids of Khuney and Snofru in Meidum and Dahshur, respectively. And now, the ideological momentum of transferring the pyramid form to the tomb of the pharaoh intervened.

Thereafter the Great Pyramid became the most outstanding, most majestic, really inimitable example, a prototype still offering the followers several innovation possibilities. It is unnecessary, of course, to mention the well-known pyramids of dynasties 4 to 6 (Giza, Abusir, Sakkara) as the first constructions arisen as a type of this genre, according to the uniform concept, in spite of their different dimensions, the careful, individual construction and classic shaping. This stage is the period of the first type, together with a local type.

The tomb of Mentuhoteps in Deir el-Bahari by and by breaks with the habit of pyramid building and stakes out the course for the New Kingdom to develop the forms of tomb and mortuary temple. Within the complex of the pillared hall on a terrace, the pillared yard space behind it, and the tomb recessed in the rock, the pyramid is only one component. In the present terminology this might be an example of composite variety, giving rise to reflection — as, up to now, the composite has always been the last stage — that it was the end play of pyramid construction. But political-ideological circumstances due to a change of dynasties caused royal tomb architecture to return to pyramids. Kings of the twelfth dynasty (Amenemhat I, II, III and IV, and Sesostris I, II and III) were buried in from many aspects certainly standardized pyramids of Lisht, Dahshur, Lahun, Hawara and Mazguna. Standardization is manifest from the diagonal and orthogonal framework and filling, and still more from standard, uniform dimensions. Seven among the pyramids of the above pharaohs had 105×105 m sides, and the last pyramids measured just the half of it, $52{,}5 \times 52{,}5$ m sides. In the cemetery of workmen employed at the concealed burial chambers of New Kingdom pharaohs, the pyramid reappeared not as a funeral construction but as a mortuary chapel at the entrance of the grave cut into a rock, certainly to be considered as a surviving form. In the mid-1st millennium B.C., a thousand years after the last pyramid, kings of Napata and Meroe in Sudan still felt like having to adopt this form, but compared to their prototypes these tombs could but evoke a smile, just like the one in Rome of Gaius Cestius, an official having travelled in Egypt.

Thus, in the pyramid development, the six stages of the trend of generalization may be demonstrated, though with some difference. Mentuhotep's composite variety preceded special types of the Middle Kingdom, or neglecting this single one, the composite type is missing.

The outlined events of Egyptian tomb architecture exhibit the independent trend of development of the mastaba. The prehistoric burial mounds

were doubtless precedents and trials at mastabas, of the two local types: under the archaic dynasties, the geometric, truncated pyramid mastaba of Abydos in Upper Egypt, and the panelled palace model type of Sakkara in Lower Egypt. By the time of the third dynasty, the regional type of the shaft mastaba ripened. Two ways of further specialization arose concerning the composite mastaba. The stepped mastaba led to the formal and structural development of pyramids as outlined above, while functional differentiation, need of a mortuary chapel resulted in composite mastabas (Ti, Mereruka, etc.). Also the survival of mastaba is unambiguous, namely in the late, declining period, the same tomb type reappeared.

Let us dwell on the cultic architecture of Egypt, namely on temple architecture.

Few remnants subsisted from the predynastic age. The benben stone (menhir) was an object of some mythos of genesis, its descendant the obelisk, an object of the Sun cult, may be relegated to about the fourth millennium. Archaic settlements of Hierakonpolis and El-Kab might be fortified peasant villages. In the middle of the first one there was a stepped podium of an irregular ground plan, topped by a circular, maybe wickerwork building, supported on four posts, a type known from hieroglyphs. Representations from the archaic age testify the one-time existence of shrines or chapels of different forms, made of some lightweight material. In addition to circular ones, there were some with animal forms, with a square ground plan, and a transferable one, on slides. The first known cultic brick temple was built in the archaic age and dedicated to Khentiamentiu. Among this variety of shrines, the zoomorphic and the square wickerwork corniced types were simple ones and ripened into types by the time of the third dynasty. These forms were underlying the Heb-Sed chapels of the Zoser complex. There are but few festive or cultic temples from the time of the Old Kingdom. One is the Sun shrine of Neuserré (Abu Gurab). On the artificial hill of Hierakonpolis an independent shrine building of a series of three or five statue recesses is known. A similar building was at Kassr el Saga. The complex of Medamud from the times of the Old Kingdom is quite peculiar. Two chambers were concealed under two artificial hills, both connected to a common parvis via waveform galleries. According to our terminology, this is about the end of the trial period of Egyptian temple architecture.

Architecture in the Old Kingdom naturalized several achievements, such as the columnar or pillared courtyard, the wide hall, T-shaped space connection, pillared halls or porches. Still, the developing festive temple architecture of the Middle Kingdom seems to have adopted hardly anything of them, as if architectural forms matured in the cult of the dead were under taboo, and as if the different architecture were expected to ripen its own set of forms in a different way. In the Middle Kingdom, endeavours to create

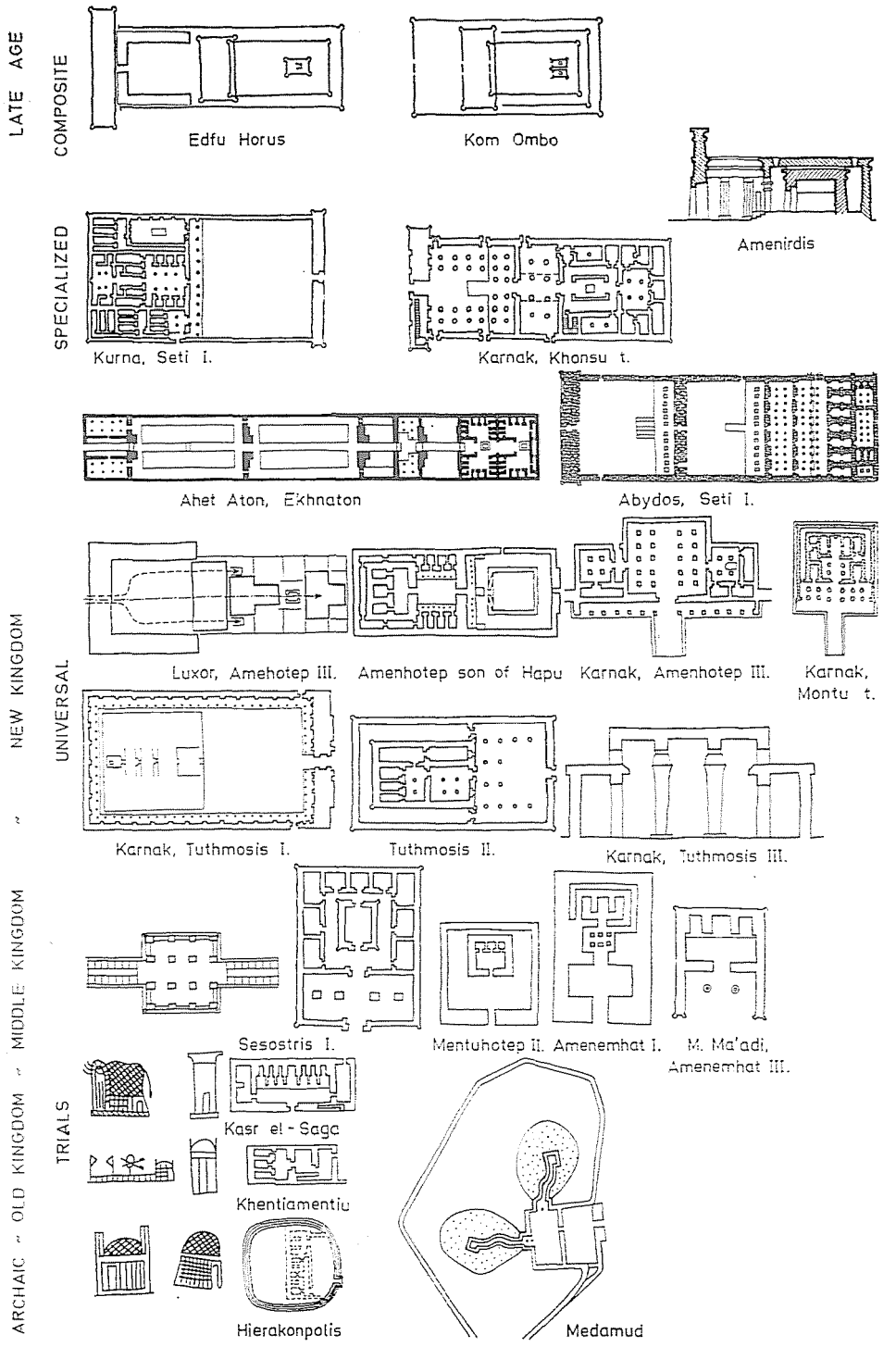

Fig. 3. **Generalization of Egyptian temples**

modest varieties of shrines dedicated to gods are known. The shrine of Mentuhotep II (2000 B.C.) on a square ground floor (Gurna), with three statue recesses, was placed nto the background of a courtyard of similar proportions. The parvis of the returning three-cell shrine, built under Amenemhet I, looked like an axial U-shaped columnar courtyard with a forecourt, while the thick walls were still of the Old Kingdom-type.

Under the rule of Sesotris I (mid-20th century B.C.) a new ceremony arose, that of the god statue procession, requiring shrines to rest at certain points of the path, and a bark shrine as constant residence for the bark. For the first function, a hall-like building with 16 piers was built in Karnak. As a solution of the second function arose the arrangement of festive temples with an axial layout.

In the Medamud temple complex of Sesotris III (early 19th century B.C.) the bark shrine was enclosed by a peristyle, a side space and a backyard. Thereafter the three-cell shrine received a form of its own with a columnar porch parvis, and its axial layout corresponded to the simplest temple type (Medinet Maadi). The end of the Middle Kingdom may delimit the development of primary types in Egyptian temple architecture. In conformity with the statements above, one may speak of local types, namely the form of shrine with a porch is known from the Delta-Fayum region, and the bark shrines from Thebes.

The age of development of Egyptian temple architecture is that of the New Kingdom, in particular the three centuries between the rules of Tuthmosis I and Rameses III (about 1500 to 1200 B.C.) during which nearly all significant Egyptian temples and subsisting monuments had been built, styles interchanged at a speed exceeding that in the European history of architecture, essentially suppressing separation between mortuary and festive temples and their architecture, and at last, while architecture striving to monumentality has tried out three methods, increasing the two or three elements of its former arsenal (shrines with statue recesses, cell, bark shrines) to eight or ten ones. To enhance monumentality, a new means was the evolution along the architectural axis, and the synthesis of proven varieties of multiple architectural means. The means of architecture were enriched by the columnar courtyard and hall, the pylon, the stepped terrace and the hypostyle. Tuthmosis I framed the significant centre building of the Amon shrine from the Middle Kingdom in a columnar courtyard, with a head wall that was an almost perfect pylon. Tuthmosis II, his successor, enlarged his funeral temple in Medinet-Habu again by the method of framing. In addition to the possibility of framing, Hatshepsut enhanced the architectural axis of the Amon shrine and its axial relation to other temples by a row of pylons and obelisks, she has set out her funerary temple also in the axis of the principal shrine. This latter, with its stepped terrace system, was a pattern for subsequent building.

The jubilee (Sed) hall of Tuthmosis III is the first hypostyle, the first basilical structure, exhibiting a new form of a column, that was, however, never followed. In the jubilee hall of Amenhotep II, the terraced solution after Hatshepsut has already been made use of, just as for the first temple of Montu built under the rule of Amenhotep III. In fact, Amenhotep III's constructors applied quite a number of new solutions. The Amon temple complex was extended by a huge pylon, and as a counterpart of the shrine of Amon in the north district of Thebes, the Luxor temple of the same god had been built in the south district of the town, to be considered as the first monumental festive temple. The archaic concept of "temple = god's house" was understood in the strict meaning of the word, so the innermost shrine took the form of an apartment, by featuring a T-shaped floor plan connection typical between living rooms and reception halls of houses serving families. A new achievement was the vestibule hall of four rows of columns and the columnar gallery around the courtyard, embracing it in a U-shape. In spite of its compositeness, the temple complex is a harmonic unity, the deepest impression being made by the slender, fluted columns with closed bud capitals. In the funeral temple of Amenhotep, son of Hapu, the favorite of Amenhotep III, the courtyard was replaced by a pond, most probably of an impressive beauty, imitating nature, characteristic of the Egyptian temple. During the rule of the reformer pharaoh Ekhnaton, it is rather the representative palace construction that developed, in temple architecture almost nothing new was achieved. Sun altars in the open needed no special architectural frame, thus, the Aton temple was simply a sequence of pylons. Restoration did not entrain architectural innovations at the beginning. It was only later that achievements of previous ages melted in a harmonic synthesis in varieties of the festive temple. In the Abydos temple of Seti I the parallel axes, the succession of four terraced levels, the pylons, the two stripes of the columnar porch on the façade and of the columnar hall fused as architectural solutions of earlier times, independently or joined by a few elements. So is the mortuary temple in Thebes: three parallel axes, outer and inner terraces, still fluted, but rather clumsy columns with bud capitals on the façade porch, and the building itself is composed in a domino system of three main and three uniform subordinate architectural elements.

The final synthesis took place at the time of Rameses II. In the great hypostyle hall, the basilical Egyptian structure obtained its classic form, followed in the Ramesseum; anyhow both festive and mortuary temples began to follow a definite ground plan system: pylon, courtyard with columns or Osiris pillars, façade hall, hypostyle hall, bark room and shrine. By the time of Rameses III, the canonic Egyptian temple had already a fully developed type. This is how his Khonsu temple in Karnak, facing north, was built, later surrounded by the first courtyard.

In the subsequent seven centuries, the history of Egypt offered little opportunity to architectural development. Though Egypt remained what it was, and had its top achievements in temple architecture according to the outlined logic of development. Composite Egyptian temples have come into being but by far not so as shown for Mesopotamia. The type of the festive temple was modified in a deeply rooted Egyptian way. The perspicuous longitudinal axis remained but was stopped in front of the pylons at a transverse Mammisi building, court of honour or port jetty. Also the traditional series of rooms subsisted, but all its elements previously synthesized in the presented way regained their independence, aligned building box-like along the axis, or intercalated like boxes. The first example of spatial superposition is the station chapel of Tuthmosis III in Karnak. During the Ethiopian rule the idea of spatial framing emerged again for the temple of Amenirdis, Thebaean high priestess. And finally, the Ptolemaic age topped the process in temple architecture. The principles of framing and of loosely systematizing independent architectural elements and units in temple architecture had been implemented with a theoretical consistence. The construction of the Horus temple in Edfu begun in 221 B.C. The innermost independent construction is the monolithic statue recess, an archaic shrine form. It stands in a building, similar to the earlier bark shrine, excentrically located in a further building mass including by-spaces and the columnar hall. In the 1st century B.C. a pylon-like new columnar hall was added, somehow slid onto the pre-existing mass. The L-shape of two column galleries, connected neither to each other nor to another element bilaterally to the courtyard, clearly illustrates the principle of constructing from elements. The cornice of the surrounding wall is interrupted before the pylon for the unambiguity of formal independence. This is the sixth separate element of the temple, the seventh one being the pylon. The principle of framing is still more consistent for the temple of Haroeris and Sobek built from the second century B.C. till the Roman age. A similar framing method was applied in building the Hathor temple in Dendera during the Roman imperial period, involving five or six layers. Thus, development of the Egyptian temple about fitted the sectional trend of development, but of course, with different local features.

And last, let us have a look at the most humble element of architecture, development of the brick — irrespective of time limits of Antiquity.

Its history of development embraces some ten thousand years. The first two or three thousand years make up the age of recognition, and about the same do that of experiments in the East. The other four or five millennia are the classic period of development for permanent brick forms and dimensions and of the relevant technology. The next event after burning was the advent of lime mortar. Special types included bricks with surface reliefs, and later structural profile bricks. At the end of development — today — composite

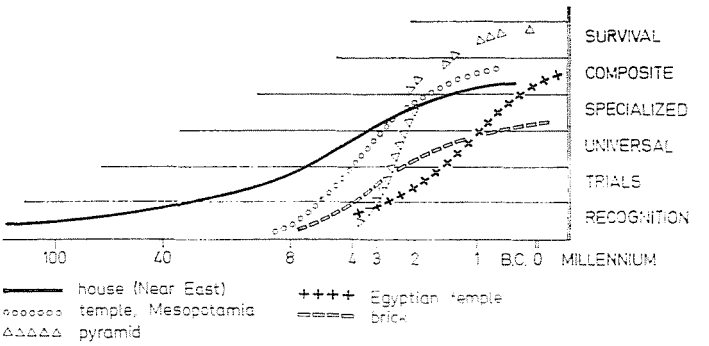

Fig. 4. Trend of generalization in the architecture of Ancient East

brick structures appeared, while standard bricks looking back to four thousand years invariably meet mass demands.

As a conclusion, generalization of practice is understood as a process of the history of technique where harmony between material, structure, function, and thus between purport and form, is ever boosted by regular activity. This process — in its pure form — seems to be free of disturbances. Let us not forget, however, that this development may be sectioned into six stages according to the present classification. Among them the process ending with the appearance of types or standards — in our case the first four stages — is the most important, it being generalization in the strict sense of the word; namely the appearance of types and standards is equivalent to wide extension and generalization. Thereafter more complex technical or ideological consequences follow.

Plotting the outlined development, processes on a time axis distorted to ease representation yields rather similar logistic curves, trends of practice generalization. The diagram in itself indicates that development of architecture may be understood as one manifestation of archaic technique, irrespective of the fact that architecture is a much wider discipline than is technique. Different positions and slopes of curves plotted for architectural genres may yield further deductions. The general development of the architecture of Ancient East is obviously described by the envelope curve, and so could be described the technique and architecture of later ages — Antiquity, Middle Ages, modern times, etc. Let us point out that similar logistic curves are applied by economists and biologists to describe productional and natural processes. Provided this confrontation is valid, then a rather generally valid regularity of the development of architecture could be grasped, sectioned into six stages, perhaps instructive for other studies in the history of technique.

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