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Source: *The Journal of Aesthetic Education*, Vol. 19, No. 1, Special Issue: Paestum and Classical Culture: Past and Present (Spring, 1985), pp. 49-66
Published by: University of Illinois Press
Stable URL: http://www.jstor.org/stable/3332558
Accessed: 31-01-2016 14:03 UTC

The Doric Temples of Paestum

SARANTIS SYMEONOGLOU

To the casual observer looking from a distance, one Doric temple looks very much the same as another. Most are poorly preserved, because following the collapse of the ancient world in the fourth century A.D., they were deliberately and systematically dismantled so that their stone could be reused for other purposes. Nevertheless, perceptive observers, if they take the time to do so, can discern the special qualities of each of the Doric temples and discover that, in fact, one is really not the same as the next.

In this, the age of reinforced concrete, structural steel, and glass, we need to be reminded of some of the difficulties which the builders of Doric temples had to overcome: a perfectly level platform had to be created, large blocks of stone needed to be carved and fitted together with great precision, and columns had to be spaced with great accuracy if the temple was to *stand*, much less look beautiful. During the sixth century B.C., when the Greeks had learned the basic techniques of stone carving from the Egyptians and decided to replace wood and mud brick with stone, they managed to surmount these difficulties. Throughout Italy and Sicily during the sixth and fifth centuries B.C., the Greek colonies, enjoying a period of prosperity and productivity, constructed numerous temples; all were in the Doric style, but care was taken to give each one special architectural features to ensure its distinctiveness. Great variation is seen in the number of columns, the size of the temple as a whole, and the proportional relationship between front and flank and the other parts of the building. Unique details of execution attest to the individuality of the architect. We rarely know the names of the Greek archi-

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Journal of Aesthetic Education, Vol. 19, No. 1, Spring 1985

tects who built these early temples; only once, at the temple of Apollo at Syracuse, did the architect carve his name on the temple itself. Construction proceeded in accordance with mathematical calculations in order to achieve the desired aesthetic result as well as structural stability. The stone was meticulously carved, and no effort was spared to provide the temples with beautiful decorations.

Of all the ancient cities in Italy and Sicily, only Paestum has three temples that are very well preserved (fig. 1). By some stroke of good luck, they remained unnoticed, if not forgotten, from the Late Middle Ages until the years between 1734 and 1740, when the construction of a road revealed their existence.[1] Since that time, their proximity to Naples has made it relatively easy for a continuous stream of visitors to see and study them. Among the earliest visitors were such renowned men as Winckelmann, the great scholar, who went to Paestum in 1758,[2] and Goethe, who went in 1777.[3] Both wrote glowingly about their visits, thereby generating interest in Paestum throughout Europe. The many who followed them contributed to the romantic view of Paestum as a reminder of the Greek and Roman past. In addition, many scholars—for example, Aures and Koldeway and Puchstein[4]—prepared detailed studies of the temples.

The earliest of the three temples, built ca. 550 B.C., was dedicated to Hera (temple of Hera I, also called the "Basilica"). Next was the temple of Athena (known previously as the temple of Ceres, or Demeter), built ca. 510 B.C. The third temple, though usually called the temple of Neptune (Poseidon), was apparently also dedicated to Hera (temple of Hera II), and was built ca. 450 B.C. It is odd that there was no temple dedicated to Poseidon in a city named for him (Paestum was originally called Poseidonia). Perhaps there was one at Sele, the settlement that may have preceded Paestum,[5] but recent excavations have shown conclusively that the preeminent deity worshipped at Paestum, even more important than Zeus, was Hera.[6] The explanation for this may be that the colonizers of Paestum came from the northern Peloponnesus (perhaps settling first at Sybaris), where Hera was the foremost goddess. Her cult at Paestum was modeled after that of the Argive Hera, whose sanctuary was considered the most important on the Greek mainland. She was the protectress of Paestum and as such had militant characteristics.[7]

The position of the temples within Paestum and the plan of the city as a whole were first revealed by aerial photographs taken during World War II.[8] Recent excavations have confirmed the validity of this plan and have provided more information about the center of the city where the temples are located. Paestum is shaped like an irregular rectangle; its long axis (approximately 1,500 meters) is marked by a broad street (Decumanus) which runs east-west. The shorter, north-south span (approximately 1,000 meters) is marked by another street (Cardo). A broad area has been exca-

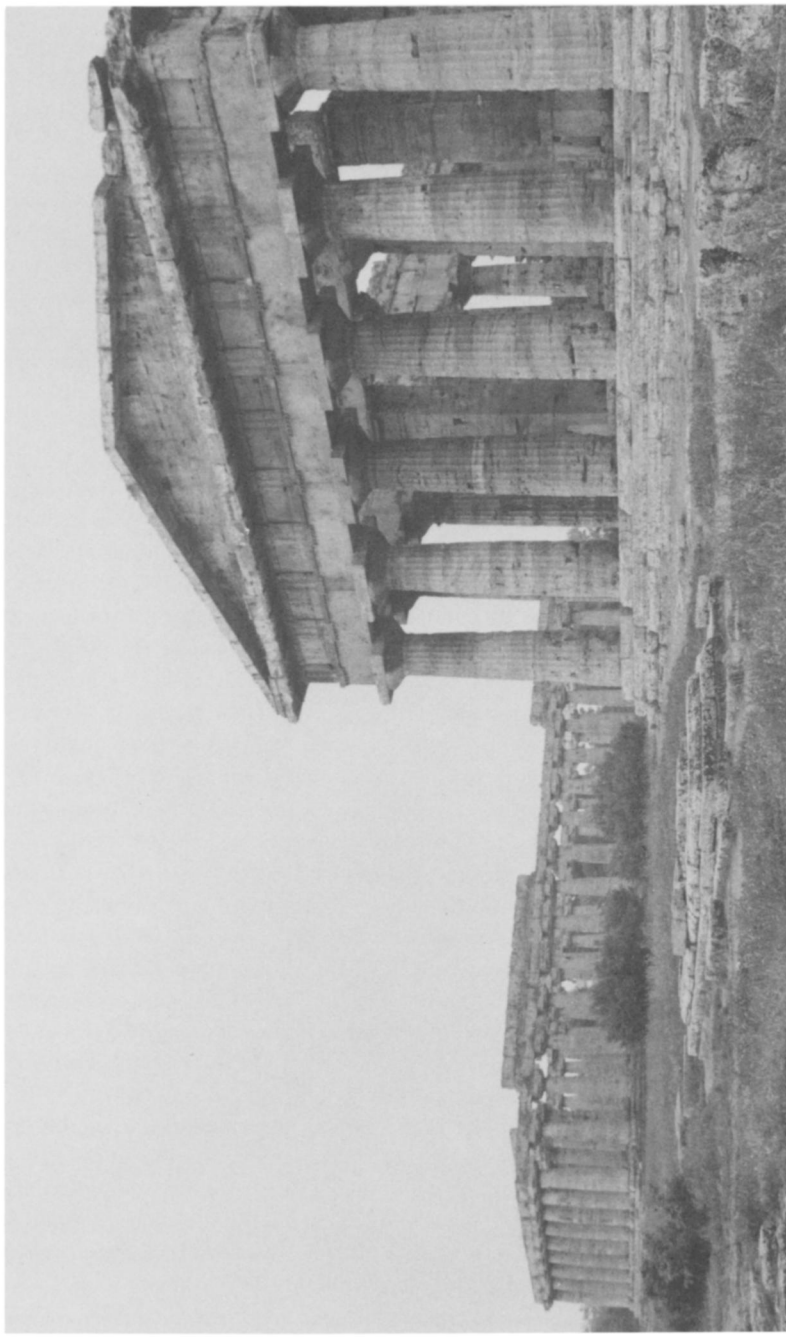

Fig. 1. Temples of Hera I (left) and II.

vated along the Cardo, revealing the presence of many public buildings in addition to the temples. In the southern part of this area, the two temples of Hera stand side by side; the temple of Athena is about 500 meters to the north.

The temple of Hera I (fig. 2) is a large structure measuring 24.52 x 54.30 meters (80 ft. 5 3/8 in. x 178 ft. 0 5/8 in.) at the stylobate, the uppermost of three steps which make up the visible portion of the foundation platform (also called the crepidoma), a characteristic of Greek temples. The complete colonnade, or peristyle, still stands on the crepidoma. The visitor gets the impression that he is confronted with a forest of orderly supports, because the fifty columns are distributed in an unusual fashion: there are nine columns at the fronts and eighteen at the flanks (the corner columns are counted twice; see fig. 3). Most Doric temples have only six columns at the fronts and only rarely have as many as eight (the temple of Artemis at Corfu, temple G at Selinus, and the Parthenon). The presence of eight to ten frontal columns is more typical of Ionic temples, such as that of Hera at Samos and that of Artemis at Ephesos, which have eight at the front and nine at the back, or the temple of Apollo at Didyma, near Miletos, which has ten at the front and back. The nine-column front at Paestum is but one of many individual features of the temple of Hera I. Some of the others became apparent after detailed measurements of the structure were taken (more recently by Krauss and Riemann).[9] One of the features requiring greater scrutiny is the spacing of the columns, which is measured in interaxials (from center to center). In Doric buildings, columns are usually spaced evenly all around; occasionally, the frontal ones are farther apart than those at the sides. In the temple of Hera I, the frontal interaxials are, for unknown reasons, narrower by 23 centimeters (9 in.). Yet another unusual feature, one that is seen only in the very early Greek temples (such as the temple of Apollo at Thermum or the earliest temple of Hera at Samos), is the presence of a column in the center of each front where the entrance should have been. Thus, the temple did not have a main entrance, and one could enter from any one of eight spaces between the nine columns. Having passed the front columns, the visitor could enter the pronaos (the porch in front of the cella) through any one of four spaces created by three columns in antis (three columns placed between the pilasters at the lateral walls of the cella). From the pronaos, one entered the cella through either of two side doors rather than a central one (fig. 4), because along the center of the cella was a row of seven columns (only three of which are still standing) which supported the roof. These columns divided the cella into two naves, which is why this temple has been called the "Basilica." Although the row of columns made it difficult to position the cult statue of the goddess centrally, it did allow for the creation of one

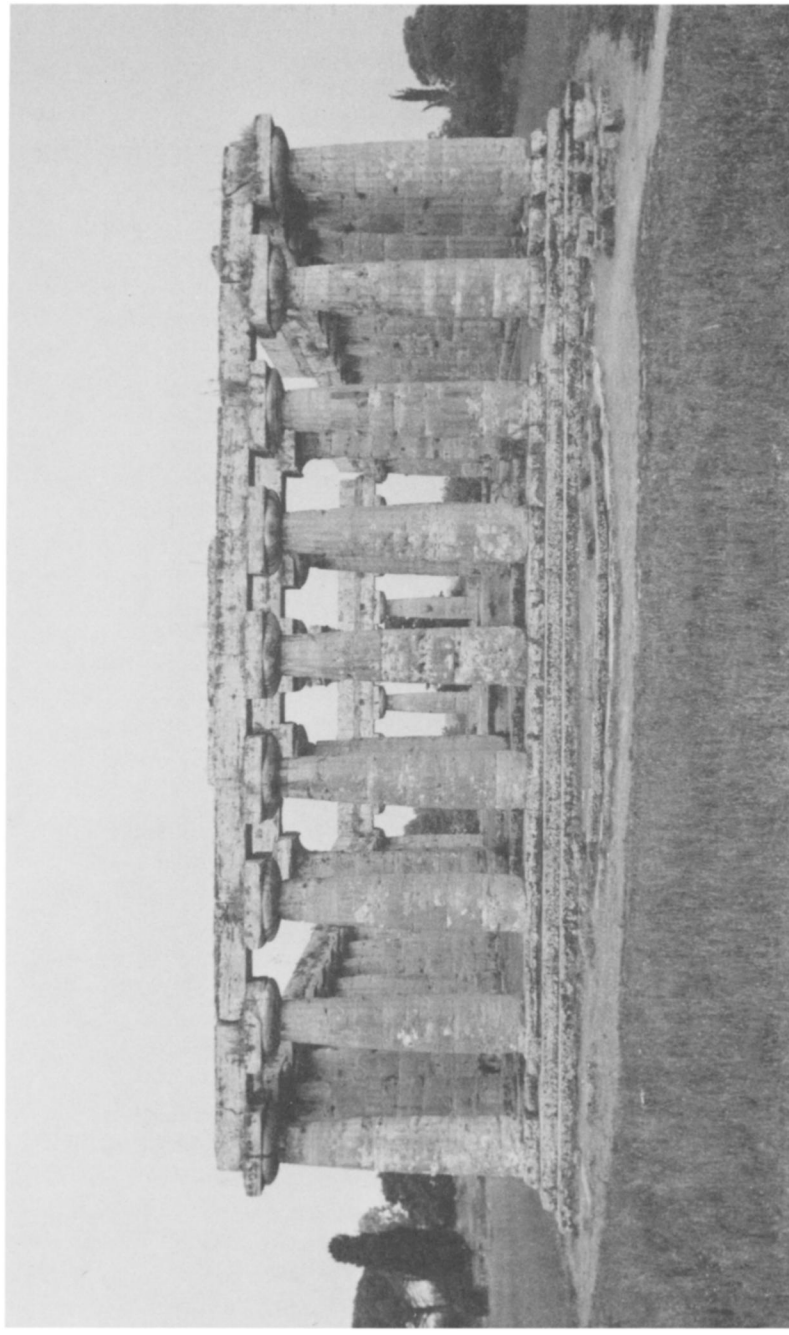

Fig. 2. Temple of Hera I, view of the east front.

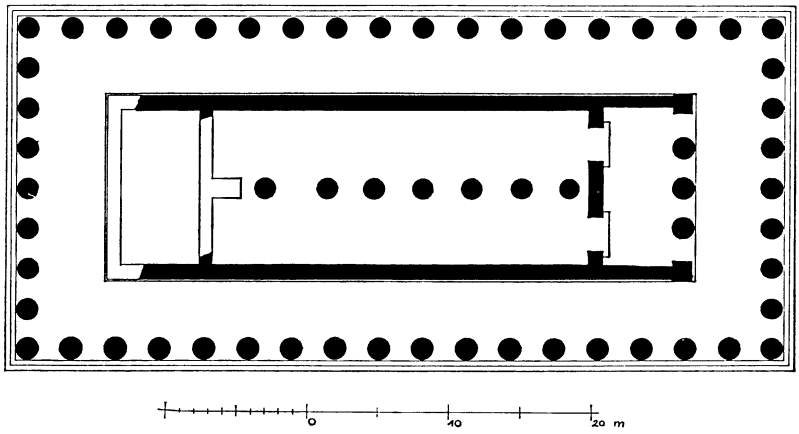

Fig. 3. Temple of Hera I, so-called Basilica. Plan by F. Krauss, reprinted with permission of Hirmer Verlag, Munich.

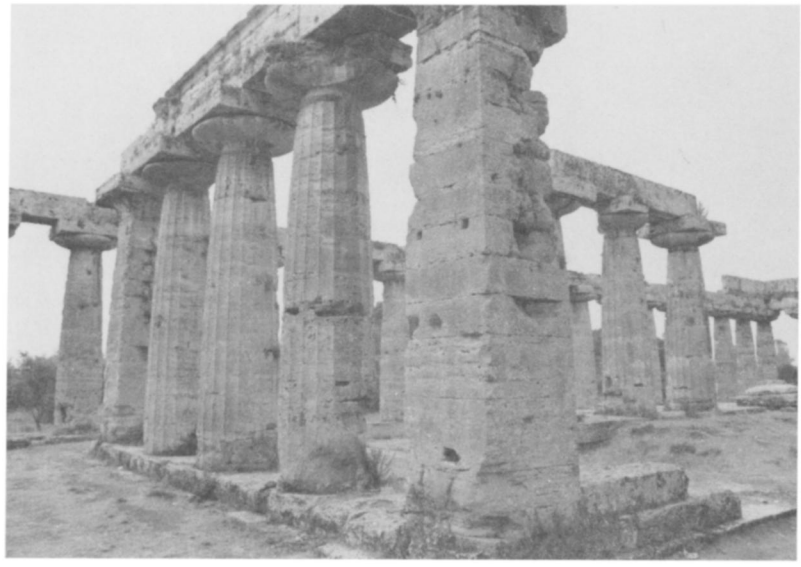

Fig. 4. Temple of Hera I, view of pronaos and interior colonnade.

of the widest interior spaces in early Doric architecture (11.48 meters or 37 ft. 8 in.). We do not really know how the seven columns were distributed or where the cult statue was placed. Krauss, who has studied the temple in detail, has proposed that the statue base was placed between the

sixth and seventh columns,[10] but it is also possible that there were two statues opposite the two entrances to the cella.

Yet another feature novel with the temple of Hera I, although it became common in later Doric architecuture, is the *entasis* (a swelling or convex curve) displayed by the columns in addition to the expected diminution of their diameter toward the top. In this temple, the entasis is more pronounced than in any other, as is also the very sharp narrowing of the diameter of the columns at the top. Moreover, each column has individual ornamentation. If one looks carefully at the very top of each column, one observes a groove decorated with a row of carved leaves; just above it, at the bottom part of the echinus (the round, cushionlike molding on top of the column shaft), there must originally have been other beautifully painted designs, but on the west side of the temple they are actually carved (fig. 5). Each echinus has a different ornament, delicately carved, providing each column with a distinctive individuality.[11]

The architect of this temple must have been very daring and innovative. He not only introduced new elements which later became common to the Doric style, but he also incorporated some features of the Ionic style, such as the nine-column front and the delicately carved ornamentation. We cannot know what other innovations there may have been in the missing frieze. This architect was probably one of the first to temper the purity of

Fig. 5. Temple of Hera I, detail of capital at west front showing the carved moldings.

the Doric style by introducing Ionic elements, a practice that was expanded in later structures, such as the one we are now about to consider.

The temple of Athena (built ca. 510 B.C.) is one of the most interesting structures of the ancient Greek world. In it we find not only the first appearance of elements that were later to be assimilated into the Doric style, but also others that are unique to this temple. Even to the untrained eye, the beautiful proportions give the temple an elegant appearance. As it has been studied and measured in great detail,[12] we do know that its plan was very carefully thought out and very accurately executed (fig. 6).

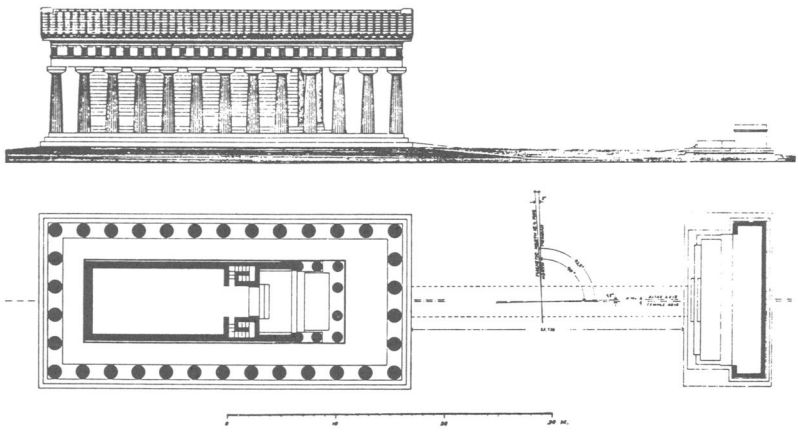

Fig. 6. Temple and altar of Athena. Plan and elevation by F. Krauss, reprinted with permission of Hirmer Verlag, Munich.

The temple is oriented almost exactly to the east (there is only a slight error, 1.5° to the south). The altar is on the same axis as the temple, except for a minor deviation, and is exactly as broad as the width of the temple. The temple of Athena is much smaller than the temple of Hera I; it measures 14.54 x 32.88 meters at the stylobate (47 ft. 8 3/8 in. x 107 ft. 10½ in.), which corresponds to 44 x 100 ancient Doric feet, making it a *hecatompedon* (100 feet, an even number used in religious architecture). What is extraordinary about these measurements is that the ratio of breadth to length is almost exactly 4:9 (or, as Dinsmoor preferred to calculate it, 1:2.261) and is combined with the "perfect" number of columns: 6 x 13. These relationships, which came to be considered ideal for Doric architecture and were to be incorporated into many classical temples—such as that of Poseidon at Sounion, of Zeus at Olympia, of Hera at Acragas, and of Hephaistos in Athens—are seen for the very first time in the temple of

Athena at Paestum. Since they cannot be considered haphazard, we may suggest that the unknown architect of this temple was the first to discover what was later acknowledged as the ideal proportions of buildings in the Doric style.

The creative innovation of this architect, moreover, is seen in many other details of both the plan and the elevation of this temple. All the interaxials are the same size, measuring 2.62 meters (8 ft. 7 3/8 in., or 8 Doric feet); the execution of the plan was so accurate that the margin of error in the size of the interaxials is only plus or minus two centimeters. This is the first instance in Doric architecture in which the interaxial is the unit upon which all other measurements of the structure are based. The total measurement of the five frontal interaxials is balanced by the total measurement of the twelve of the flanks (40 x 96 Doric feet). Other measurements of the structure are based on these: for example, the exterior measurements of the cella (breadth, 20 Doric feet; length to the antae, 48 Doric feet) are exactly one half of the front and flank interaxial measurements (40 x 96). It has been recognized that this was the first temple built in accordance with a rule of proportions which binds together the various parts of the structure in a unified and harmonious composition.[13]

The most striking feature is the incorporation of many Ionic elements, some of which can still be seen on the well-preserved west front (fig. 7). The Doric columns show a leaf pattern carved at the junction with the echinus. The triglyph frieze is bordered by Ionic moldings instead of the usual Doric guttae. Above the frieze, where one would expect to see the horizontal cornice (here omitted altogether), there is another Ionic molding which forms the bottom line of the pediment. The absence of the horizontal cornice is surprising and is probably the result of Etruscan influence.[14] The underside of the raking cornice (or sloping cornice of the pediment) is decorated with sunken coffers, while the face (or sima) has a band of elegantly carved anthemia; at the sides of the temple, the anthemia of the sima alternate with lion-head spouts. We must remember that all of these sculptural details were once painted in various bright colors. The overall effect must have been ornate but aesthetically very pleasing, because the decoration beautifully modulated the austerity of the Doric style (for a reconstruction of the front, see plate 4 in Krauss).[15]

Unfortunately, the most striking Ionic feature is not preserved and has had to be reconstructed on paper (fig. 8). Instead of the usual pronaos (with two columns in antis), the architect of this temple designed a deep porch which had six free-standing Ionic columns, arranged so that four were in front and the other two behind the corner columns. The ends of the cella walls were themselves shaped to form three-quarter engaged Ionic columns, so that the overall view of the porch showed four Ionic columns

Fig. 7. Temple of Athena. Reconstruction of northwest corner by F. Krauss, reprinted with permission of Hirmer Verlag, Munich.

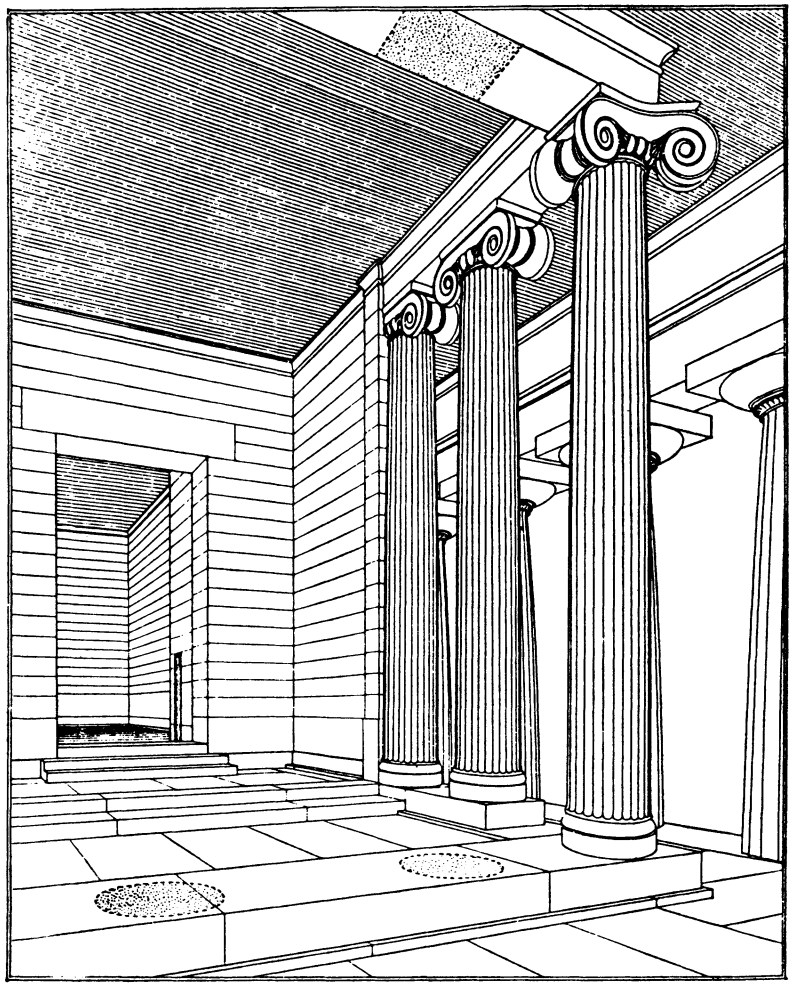

Fig. 8. Temple of Athena. Reconstruction of pronaos with its Ionic columns by F. Krauss, reprinted with permission of Hirmer Verlag, Munich.

in the front and three on the sides. This porch must have looked very strange within a Doric colonnade, especially in Italy where no Ionic columns had been used before. The slender proportions of these columns, with their simple bases and big volutes on the capitals, suggest an influence from Ionia itself, perhaps from Samos.

By incorporating Ionic and perhaps even Etruscan features, the architect of the temple of Athena clearly wished to soften the austerity of the

early Doric style. If we appraise his work from the perspective of the developed Doric style of the fifth century B.C., it does appear awkward and strange. Dinsmoor, on the basis of such a perspective, pronounced both this temple and the temple of Hera I "examples of the South Italian mixture of provincialism with Ionic and Barbaric influences."[16] If, however, we appraise these temples in their own context of sixth-century Doric architecture, they appear sophisticated and progressive. The temple of Athena in particular anticipates the fusion of Doric and Ionic styles in such universally admired structures as the Propylaia and the Parthenon on the Athenian Acropolis. Far from provincial, the early temples at Paestum may be seen as successful attempts to broaden and enrich the heavy, austere Doric style.

The third and best-preserved temple at Paestum (temple of Hera II) was built at the beginning of the classical period (fig. 9). It is usually dated between 460 and 450 B.C.,[17] after the construction of the temple of Zeus at Olympia, but a date after 440 B.C. has also been proposed.[18] It is more or less contemporary with such Doric masterpieces as the Hephaisteion and the Parthenon in Athens and the temple of Apollo at Bassai and thus invites comparison with them. One would expect that a Doric temple built at Paestum about 450 B.C. would appear relatively provincial. This, how-

Fig. 9. Temple of Hera II, view of east front.

ever, is not the case. It is true that the temple lacks the elaborate sculptural decorations that we find on the Greek mainland, but the monumental character of the architecture and purity of line show great sensitivity to the classical Doric style and compensate for the lack of ornamentation. In contrast to the two temples which preceded it, the austerity of the Doric style was not tempered by the introduction of Ionic features.

The architect must have been fully aware of the fifth-century preference for a strictly Doric style manifested in the great temple of Zeus at Olympia. It has, in fact, been said that the temple of Hera II closely resembles the temple of Zeus.[19] The temple of Hera II is only slightly smaller, measuring 24.48 x 59.99 meters at the stylobate (79 ft. 9 1/8 in. x 196 ft. 7½ in.). Aside from the size and the purity of Doric line, however, the temple of Hera II differs from the temple of Zeus in many ways. In fact, its closest parallels can be found in Italy itself. To appreciate this structure, we should examine briefly the most important of its individual characteristics.

Instead of using a peristyle of 6 x 13 columns (as seen in the temple of Zeus at Olympia), the architect elongated the structure by adding one column at the flanks (6 x14) (fig. 10). Thus, the expected ratio of 4:9

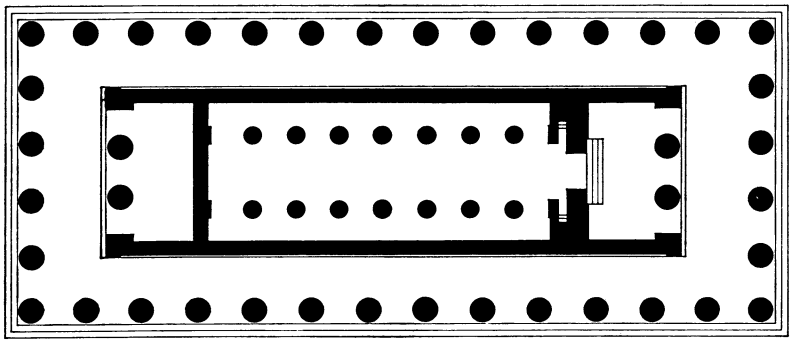

Fig. 10. Temple of Hera II, so-called temple of Poseidon. Plan by F. Krauss, reprinted with permission of Hirmer Verlag, Munich.

was changed to 4:10. The reasons for this change are not clear. It may be that this ratio represents a South Italian and Sicilian preference, because there are four other fifth-century temples with the same plan and a comparable 4:10 ratio: the temple of Athena at Syracuse and of Nike at Himera, temple A at Selinus, and the temple at Segesta. On the Greek mainland, the only temple with these proportions, that of Athena Alea at Tegea, was built in the fourth century B.C. by Skopas, the great sculptor/architect. It is possible that these proportions were thought to yield a

more imposing effect, desirable in temple architecture. In any case, the architect seems to have adhered to a South Italian rather than a Greek mainland canon. The same may be said about other details of the plan and elevation. In each of these five temples, the interaxial measurement is the same (or very nearly so) at the fronts and flanks. The columns tend to be heavy, and the ratio of diameter to interaxial is usually low (the range of ratios of all five temples is 1:2.11-2.27; in the temple of Hera II it is 1:2.12-2.21). Also, there is similarity in the ratio of column height to interaxial (the range in all five temples is 1:1.97-2.16; in the temple of Hera II it is 1:1.97-1.99). The interaxial was the basic measurement according to which other parts of the temples were proportioned; in the temple of Hera II, as in the temple of Athena, the interaxial was derived from the 4:10 ratio of front to flank.[20]

These observations may suffice to show that the architect of the temple of Hera II was working out of the Italian milieu but was familiar with the architecture of Paestum itself. He may very well have been a native of Paestum. That he was aware of contemporary attempts to solve problems peculiar to Doric architecture can be seen in his solution for the Doric angle conflict. This problem first arose when stone replaced wood: the corner triglyphs could no longer be placed above the center of the corner columns (as were the other triglyphs of the frieze), because that would have left a blank space at the end of the Doric frieze. A blank space was unacceptable, and architects tried in all kinds of ways to place the triglyph at the corner in such a way that the metope next to it did not look wider than the other metopes. They went to great lengths to achieve this. One of the more brilliant solutions appeared first in the temple of Athena at Syracuse: the two interaxials on either side of the corner column were narrowed in order to make the transition to the corner triglyph less abrupt and less obvious. This is called double-angle contraction (there is also single-angle contraction, in which only one of the corner interaxials is narrowed). In the temple of Hera II, we find a developed form of this practice: double-angle contraction at the flanks and single at the fronts; in addition, the diameter of the flank columns is slightly smaller and the interaxial slightly wider. Although it may be coincidental, all five Italian temples which have a 6 x 14 column colonnade display some form of angle contraction. On the Greek mainland, angle contraction probably was not practiced.[21]

Although the effects of some of these technical details may be difficult to imagine, they are easily discernible in the buildings themselves (fig. 11). The ancients were, in fact, capable of appreciating the many fine distinctions between one temple and another. The architects, in turn, felt confident that their innovations would be appreciated.

The features we have been describing would themselves suffice to lend

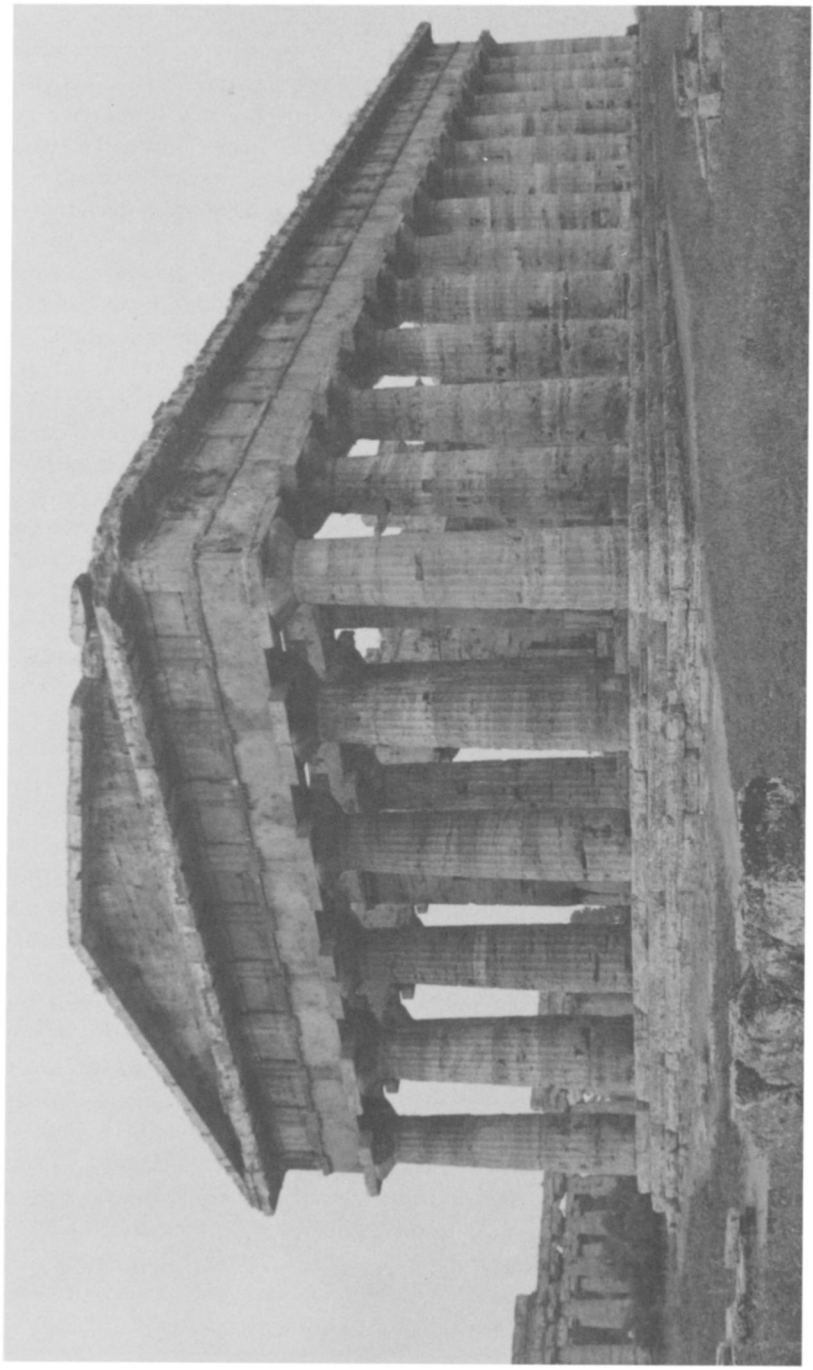

Fig. 11. Temple of Hera II, view of east front and north flank.

individuality to the temple of Hera II. There are yet others, two of which are particularly striking. The cella has two rows of seven columns arranged in double tiers, most of which are still standing (fig. 12). The cella is not particularly wide (11 meters), but the architect probably felt he needed these columns to support the ceiling and the roof beams. These extra supports contributed greatly to the stability and longevity of the structure, although some interior space had to be sacrificed. It is also possible that some ancient architects used these colonnades to enhance the aesthetic appearance of the interior. They can be found in many temples, especially on the Greek mainland (temple of Apollo at Corinth, of Zeus at Olympia, and the Parthenon), but also in Sicily: the temple of Apollo at Syracuse and the temple of Apollo (also known as temple G) at Selinus (the latter had two rows of three-tiered columns). At Paestum, the two rows are divided by a simple architrave which is crowned by a continuous molding rather than the usual regulae and guttae, the only Ionic feature (a very discreet one) of this temple.

The other unusual feature is the fluting of the columns. The architect was aware that the exterior columns were particularly heavy. Their large size may have been dictated by the size of the temple and the mediocre quality of the local limestone. In order to compensate for this, the architect provided the columns with twenty-four flutes instead of the usual twenty. In the cella, the lower tier has twenty flutes, while the upper has only sixteen. Clearly, the fluting was carefully designed to balance the three different sizes of columns used in the building.

The careful attention to detail in the planning and construction of the temple of Hera II greatly contributes to the overall harmony of its appearance. It is a happy coincidence that this building is preserved, because it was one of the most carefully designed Doric temples. Only two other structures of this quality are as well preserved: temple F, the so-called temple of Concord, at Acragas; and the temple of Hephaistos in Athens.

The three temples of Paestum are among the most important structures left to us from Greek antiquity. Each one is a masterpiece; as they were built fifty years apart, they represent three stages of development in the most creative period of Greek architecture. Thanks to the many studies of these temples, we have a better appreciation of Doric architecture than at any other time since antiquity. In his study of the temple of Hera I, Hertwig[22] has shown how sophisticated mathematical calculations were applied to architectural planning; these derived from the famous Pythagorean school of Italy, which was founded by Pythagoras himself (ca. 587-507 B.C.), one of the most important of the pre-Socratic philosophers. At Paestum, we can see how great enthusiasm and civic pride were translated into monumental architecture: after the rich and elegant temple of Hera I, we see a very innovative and revolutionary structure (temple of Athena),

Fig. 12. Temple of Hera II, view of cella and double-tiered columns.

and after that, a perfect Doric temple in which one hundred years of experience resulted in the creation of a large and harmonious building that may best be described as a beautiful work of sculpture.

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