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# SACRED GEOMETRY ON THE ISLAND OF BALI

By JOHN JAMES, F.R.A.I.A.

IN THE EASTERN PROVINCES of Bali the road from the capital Denpasar<sup>1</sup> to Karangasem passes a small exquisite lake surrounded by palm trees. Behind the lake rise a number of dramatic steep hills framing it towards the north, while beyond it the Indian Ocean sweeps to the horizon. In the distance through the blue haze lie the "islands of exile", the biggest of which is called Nusa Penida, while closer inshore a group of small rocks juts vertically out of the sea. It is one of the most evocative tropical scenes I know. The lake, as befits such a setting, is sacred. Purple lotuses cover its surface, and the two temples to Shiva and Hariti look down from the hill. It is the holy precinct of Tjandidasa.

I first visited Tjandidasa as the weekend guest of my friends I. Gusti Bagus Oka and his wife. When walking round the lake I stopped at the shrine on the northern side (*S* on the map) built in the form of a throne where the god is wont to sit. It was draped in the black-and-white-checked cloth that guards against the malevolence of evil spirits. With its back to the road the shrine looks out to sea, and when I stood beside it and looked towards the similar twin shrines which flank the outlet from the lake (*T*) I was surprised to see that I was standing on an axis which continued to one of the nearby islands. It seemed strange that the three points should be so exactly in line, but having spent the last two years investigating the history and geometry of Chartres Cathedral I was attuned to the nuances of centres and axes. This one could hardly be denied.

Climbing the wall behind the shrine, I then walked back along the road until I sighted the next island through the outlet *T*. I found I was standing near the massive gates (*M*) of the temple of Hariti, whom the locals call "The Great God with Children". I turned and climbed the steps leading through the gate, and looked back towards the outlet. Here was a second undoubtable axis from *M* via *T* to a second small island locally called Gili Kambing (Pl. I). It was almost too good to be true.

The other two islands did not seem to line up with anything along the road, so I returned to Mr Oka's house round the edge of the lake until, where the southern edge bent sharply inwards at *D*, I looked back in amazement at the shrine *S*, for here was yet another axis sharply emphasized by the straight handrail of the staircase that led from the road up to the higher more important temple to the Great God himself, Shiva. When I stood at *D* I could line up the vertical edge of the staircase (*N*) with the shrine immediately below it. Pl. II (*a*) is taken from *D*. The Shiva temple is to the top right, and the Hariti temple is below it to the left hidden behind two banyan trees.

Setting my watch against the sun I soon checked that none of these axes followed the cardinal points. I climbed the stairs to the Shiva temple, which is a simple brick-walled enclosure with a platform inside, the yoni, on which stands the vertical lingam of Shiva sheltered under a pointed canopy.

This was not oriented to the sun either, for it faced more or less to the south-west—a

<sup>1</sup> Place names are given by the spelling on the military maps, or failing this as spelt by locals. "Gunung" means mountain, "Bukit" is hill, "Gili" is a small island, and "Nusa" a larger one. "Pura" means temple.

direction the orthodox Balinese consider dangerous and inauspicious. But when I stood at the entrance to the temple and looked over the pinnacle of the canopy I saw immediately behind it the topmost peak of a nearby range of hills, which was crowned with trees and was precisely in line with the long axis through the temple. I was looking at another temple, the Puru Gumang, sited on top of the distant ridge. The Shiva temple was not oriented to the sun, but to another temple set on top of a higher hill nearby. The implications were becoming awesome.

I returned to the road in order to check the position of the image of Hariti in the lower temple. Standing on the dais I could follow its axis along the staircase through the centre of the gates and out to the Indian Ocean. Dead in line with me was the western end of the Nusa Penida group of islands in the far distance. Turning to the left I saw I was standing on the intersection of two axes: one straight ahead of me to Nusa Penida, and another that passed through the shrine *S* and the outlet *T* to the first island I had sighted earlier in the day.

What had at first seemed to be a charming if haphazard arrangement of buildings around a beautiful natural setting began to assume a deeper significance. Three of the small islands seemed to be related through one point—the outlet—to important religious elements on the other side of the lake, while the two temples had been deliberately oriented towards the major geographical features round about. I became intrigued with the possibility that this ancient religious precinct may have been set out on a gigantic geodesic scale, and that the natural topography of the entire visible landscape may have been utilized to arrange the surroundings to the sacred lake of Tjandidasa. I arranged to come back, and with the Oka's help and generosity carried out a detailed survey of the area using a conventional plane table and tape measure. I could not get a theodolite or prismatic compass, but with what I had I plotted the major elements and features of Tjandidasa.

I confirmed my original visual sightings and went on to discover that the overall geometry appeared to be even clearer than I had at first guessed. Every element in the complex had been carefully oriented to the others and to the landscape. The Balinese habitually think in terms of cardinal directions, which they automatically use, for instance, when asked the way—to the occasional confusion of Europeans. It is much more natural for them to arrange their work by axes than it would be for us.<sup>2</sup>

The Balinese are very exacting in the way they proportion their temple enclosures, and the ancient lontars, or religious texts, give minute instructions on how to set out each

<sup>2</sup> Modern Balinese houses and some temples are very exactly oriented to the sun, particularly around Ubud, where they look to the mother temple at Besakih below the huge volcanic mountain Gunung Agung as being to their north, though it is to the north-east. Besakih is surrounded by 8 subsidiary *puras* each representing one of the eight points of the compass, as Miguel Covarrubias describes in *The island of Bali*. However, none of them is on an exact cardinal alignment with the mother temple. These nine temples, more or less in order of importance (there seems to be some dispute about this), are Besakih, Lempujang on the east coast, Andakasa and nearby Sileyukti on the south coast, Batu Karoe in the centre west, Batur, Ulu Watu near the new international airport, Tanah Lot, and Pedjeng. But I am told that in earlier times there were only six temples of major importance, not nine, and that the last three on this list were added fairly recently (after the Majapahit invasion?). This suggests that the emphasis on the cardinal points may be a recent innovation overlaying a more ancient topographical tradition. The fact that *none* of the axes at Tjandidasa are cardinally oriented, but are *all* topographically oriented may add weight to this. Is it possible that in very early times the sites were set out to the landscape, and that as newer concepts came into the island the cardinal points became more important without obliterating the earlier methods?

part of a Balinese temple. The Hasta Kosala and the Hasta Bumi are difficult to interpret and I have made no attempt to read them. But whenever a temple is to be rebuilt or repaired an experienced priest is consulted who gives precise instructions on the location and size of the building and its parts.<sup>3</sup> To show that Tjandidasa is no exception let us examine one or two relationships in the layout of the temple of Shiva.

The proportions for the lengths of the outside walls are 8:9—the two numbers which in Hindu numerology signify the essences of the material and the spiritual world. The yoni platform on which the lingam sits is square and measures 3.80 m. each way. The lingam is placed towards the back of the square forming a proportion of 5:6—the numbers of sanctification and of the spirit—on the yoni platform in front of it. This is also exactly the proportion of the rectangle formed by the outside wall and the axis *XY* through the lingam. The distance from the lingam to the back wall is curiously 3.80, the same as the outside measure of the yoni. The details of the temple, the pilasters, the gate, the canopy over the lingam, and the various heights of the wall and yoni all seem to follow similar modular relationships, which would be tedious to recount and would not aid my immediate purpose, which is to show that the exact axes on which the sacred parts are set are reflected in the exact and significant dimensions of each part.<sup>4</sup>

My survey confirmed my earlier sighting that the Shiva temple was aligned with an axis to the Pura Gumang to the north-east. Looking the other way down this axis from the Pura Gumang I sighted a strange arrangement: a distant blue hill rising sharply to a peak, quite treeless except for a pronounced crown of tall trees on the summit. On either side and in front of this hill are two lower hills separated by a pass. The crowned peak rises out of the centre of this declivity between the two nearer hills. A stream cuts an almost straight path from the pass to the sea: stream, pass, and peak are in line, and lay on the axis through the Pura Gumang and Tjandidasa.

There was another temple on this peak, which I checked on the military maps, called Bukit Glogor.<sup>5</sup>

The temple of Shiva was therefore set out to the axis that lay between the two larger temples of Glogor and Gumang, and was oriented to this axis. Then why was it placed at this point on this hill? I found that the cross axis *XY* through the Lingam passes through the shrine over the creek which supplies the lake (marked *I* on the first map), through the third small island and on to the eastern tip of the distant Nusa Penida. Now it was clear that both temples had been oriented to the ends of the distant Penida group.

Few modern Balinese would deliberately set out their most sacred shrines to the sea, since their religion turns its back on the ocean, and looks to the three mountains as the home of the gods. Nusa Penida itself is seen as the “lair of all evil forces, illness and

<sup>3</sup> The temples are set out from a complex set of proportional rules, where the sizes and the relationship of the parts depend on the classification of the temple. The basic measures used stem from the human body: the length of the priest's foot, the distance between his outstretched fingers, the size of a knuckle. These variable yet human lengths are combined according to the strictest categories, where insight is often as important as the rules. Even numbers and exact symmetry are seldom used, and to every precise proportion a small increment is added to prevent it being too regular.

<sup>4</sup> Ida Made Djelantic was in charge of rebuilding this in 1956/7. He told me he instructed the craftsmen to use the old footings exactly as they were, and to copy the earlier dilapidated work in every respect.

<sup>5</sup> Dutch military map 1:50,000 scale, HIND 1119 sheet 63/xliv-B First bilingual edition. Glogor is 350m. high, Loewger half as high, and Shiva Tjandidasa 50m.

troubles. There resides 'The Great Lord of the Fangs', the cholera demon" himself.<sup>6</sup> But where modern ideas conflict with very ancient facts we may have to re-examine the way these ideas evolved.

As can be seen in the small-scale map at the end of this article it seems that both temples were placed on the side of this hill because their respective axes could be so sensitively elided with the major features of the topography. It may be that the temples of Glogor and Gumang on the axial peaks are part of a gigantic topographical arrangement of trigonometrical points from which many other religious sites on the island might have been located and oriented.

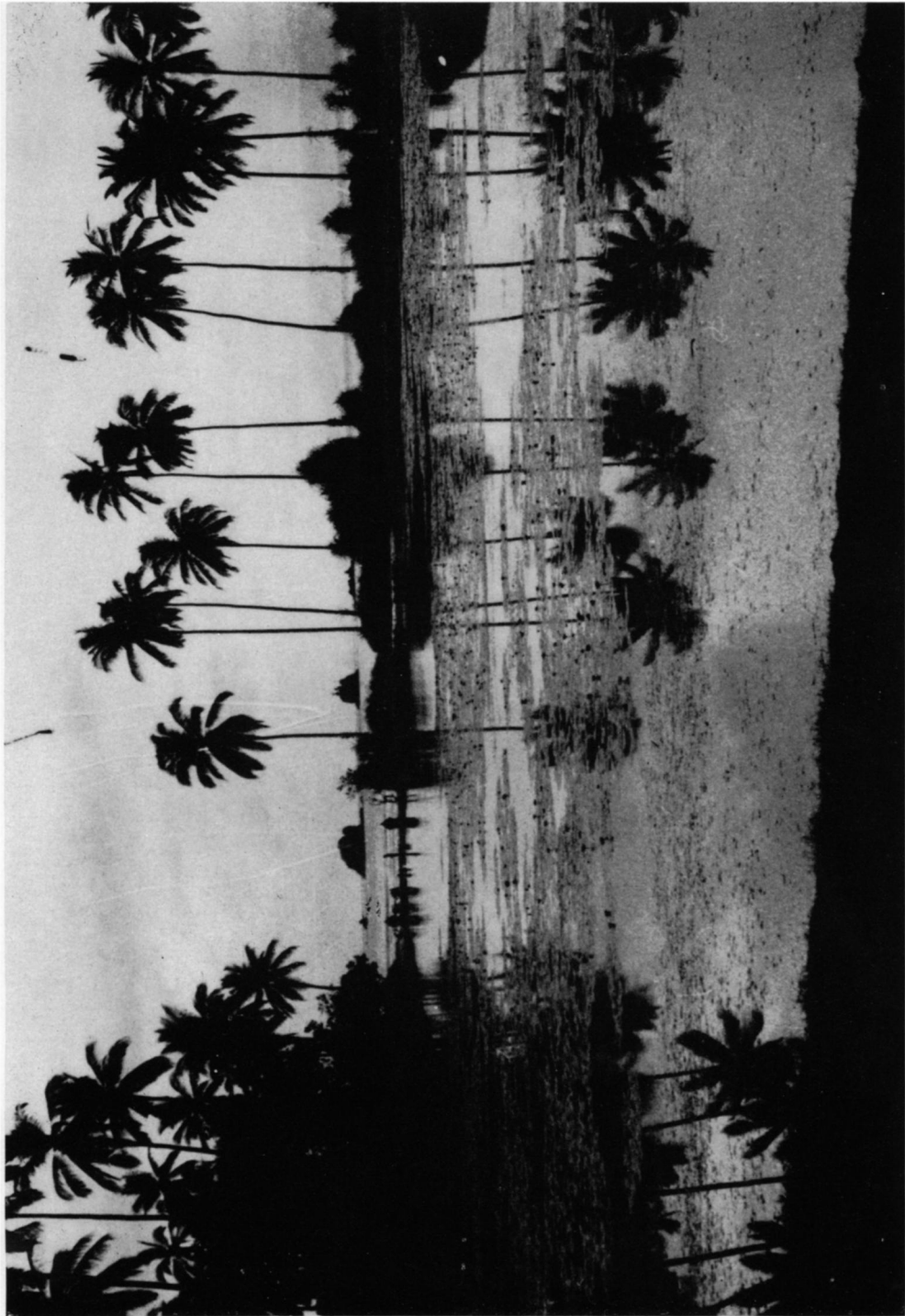
I admit the suspicion that I may have been finding only those things I was inclined to look for. Was I asking too much of the early architects and priests, perhaps pre-Hindu, who so grandly incorporated the geometry of the peaks and islands into the placement of their most sacred sites? Part of the lower temple of Hariti was rebuilt only a few years ago when a large tree collapsed from the cliff above it. The Administrator Ida Made Djelantic denied any thought of geometry or axes when he built the new parts of the temple. He had just placed the shrine and the surrounding platform where the priest instructed him to do so. The priest had visited the site, and with ceremony and meditation had determined the right place for the new work. In most places the builder built over the old foundations as the collapse had not eradicated the ancient remains, but only thrown them down. Round about the upper temple, the gate, the lake and its shrines, and the distant islands remained untouched. How, then, was the geometry maintained?

To understand this we must consider the meditative process and the way these sacred sites could have been developed piecemeal over many centuries. The recent builder seems to have been the first to erect the pillars on each side of the Hariti gateway *M*, though the location for the gate with its steps and the very old flanking banyan trees had been established long before.

It seems to me that the present complex grew bit by bit in this manner, with many different priests directing the work of many separate building operations. Step by step the gurus would meditate on the natural form of the site, and as the group of buildings and shrines and the lake became more complex, successive generations of priests would relate each work to what had been created before until all the parts began to be related more and more closely to one another.

This could have been done without instruments or a master plan. Just as I had been able to site the primary axes visually, and piece by piece deduce the meaning of the whole using only the simplest equipment, so any sensitive and intelligent priest, aware of a tradition for harmonizing the shrines with the geography, would look for and would find the essential points in a system that had been carefully built up over centuries. In Hinduism, as in most ancient religions, there is a readier empathy with the powers and facts of nature than in the West. We must put ourselves in their position rather than judge from our more rigidly engineered techniques. It was more usual for them to consider the facts of the nearby hills and islands which feature so prominently around the site because their attitude and training tended to increase their awareness of nature. In China temples and cemeteries

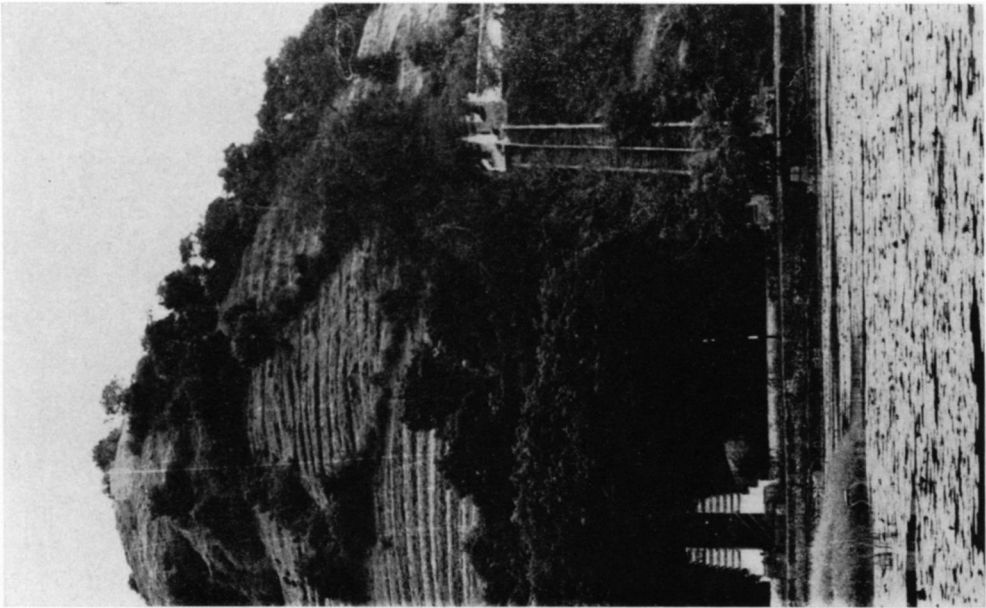
<sup>6</sup> *Bali*, ed. by the Royal Tropical Institute, Amsterdam, 1960, 38.



Lake Tjandidasa looking through the two shrines at the outlet towards the islands. Nusa Penida can be dimly seen on the right horizon.



(b) The view from the shrine and tree on the axis of the outlet and its island.



(a) The staircase to the Shiva temple on the axis of the small lakeside shrine. The Hariti gateway is on the left.

are located from a study of *feng-shui*—literally meaning “wind-water”—where the natural surroundings determine their place. The landscape of China was covered in axial lines, called *Lung-mei* or “the bath of the dragon”, that ran between high peaks and sacred precincts.<sup>7</sup> In England a similar geometry has been discerned, centring on Stonehenge. It was first proposed by A. Watkins in the 1920’s and called ley lines, which joined into one system the sun and stars, and the natural topography.<sup>8</sup> I did not have the facilities to check whether the Balinese worked to astronomical bearings, but like their northern neighbours they certainly worked from the geography.

They did this by deep contemplation of a meditative kind, often concentrating from a state of trance, rather than by the cerebral skills of the twentieth century. They had no theodolite or compass, and indeed had no need for them. The entire geometry could be set out by the naked eye with string lines and a simple right angle.

The study of a building’s orientation and siting go hand in hand. A ritual expert meditating on the significance of a place would fill his mind with all the multitude of factors that could heighten it with added meaning. In the yogic trance it is possible to “see” in the mind’s eye the essential geometry of an area forming a grid of axes and salients which, like an enshrouding web, overlay and link together the elements of territory. From the top of Pura Gumang the expert could readily have sighted the arrangement of hills drawn on p. 154 and his inner eye would have extended the line of the creek until it formed a tangible axis across the landscape crossing the hill above the lake of Tjandidasa and linking it to the two distant peaks. From the top of Gumang he would be equally aware of the little islands and the broad mass of Penida to the south, and could have registered the possibility of a cross-axis from the Pura Tjandidasa to Nusa Penida. Indeed, in a very limited way I have experienced these superimposed “visions” myself.

For a demonstration that the ancient Balinese were very conscious of the need to link the elements of a sacred precinct together visually, apart from the proportions used in the Shiva Temple described earlier, let us look at the shape of the lake. Almost every side of the lake is aligned to the major sacred points surrounding it, with the important exception of the long wall behind the shrine.<sup>9</sup> Working round the perimeter the first side *A* is square to the long wall, and seems to have been set out from the corner of the enclosure round the Hariti temple. Side *B* is angled to the shrine *S*, and the adjacent side *C* to the outlet at *T*.

The step in the southern edge *D* is on the axis of the shrine and the staircase *N*, as I described earlier. The next side, like *C*, points to the outlet. On the other side of *T* the side *F* joins the shrine *S* to the edge of the stone platform round the outlet. The next section of the eastern edge of the lake, *G*, joins, albeit in a curved way, the inlet *I* to the other side of this platform—or rather where it would be if it was symmetrical about the outlet and not buried out of sight under the sand dunes.

<sup>7</sup> See E. J. Eitel, *Feng-Shui, or the rudiments of natural science in China*, London, 1973.

<sup>8</sup> See A. Watkins, *The old straight track*, London, 1925; J. Michelle, *The view over Atlantis*, London, 1969.

<sup>9</sup> In reading the letters and books by early travellers in Bali one has the distinct impression that there were no wide roads as now, but just narrow winding tracks through the fields and jungle. The present roads and the single-lane bridges were built by the Dutch after they conquered the island in 1908—a bridge near Tjandidasa is dated 1911. Therefore the long straight edge to the lake on the northern side may have been built by the Dutch when they drove the road through here. The shrine *S* may have been where the small tree now is immediately north of it, and the ground level outside the Hariti temple may have been lower than now, as it is inside the enclosure. One more example of the circumstances of history adding to the complexity of the geometry—though in this case without sympathy.



There is next a curved bay with a straight edge *H* leading to *I*. It does not line up on the inlet, but on the tree planted just beyond it, *J*. The kidney-shaped island in the centre is in line, through the ubiquitous *T*, with the peak of the largest island, Gili Topekong,<sup>10</sup> while the north face of the kidney lines up with the south face of this island.

Before the lake had been made much of this area must have been a swamp—there is still a waterlogged patch of ground to the east of *F* filled with reeds. Probably the natural depression was deepened, the island formed, and the sides reorganized so that they more or less followed the original shape of the swamp—but at each step in the reorganization the edges were adjusted to give added significance and meaning to its outline. The direction of the sides emphasizes the more important religious features by pointing towards them. In a way the lake partakes of the character of the main complex and subtly not only adds to its meanings, but provides a solid unifying form in the midst of the area.

After all, a decision had to be made each time some part of the lake was deepened or tidied up, and what could be more natural than to work towards unity rather than chaos. Where there was a side which was even remotely inclined towards some point, it would not take much effort to realign it and make it more exact. Along *F* an embankment was built through the marsh to reduce its size to suit the overall geometry. The important consequence here is that they wished to bind and link all the natural elements together to create a unified setting for the gods where every part related to the other parts and the whole, and that the reorganization of the edges of the lake was but one step in a continuous process which was applied to trees as well as to shrines and lake.

In the north-east corner the tree *J* grows on a small promontory which swells out of the lake. The tree may be recent, but I am reasonably certain it replaced an earlier tree—for the swelling is made for it, and the side *H* points directly to its trunk. There is a similar tree behind the shrine *S* which fits into the grid of axes through this point. Outside the Pura Shiva there is a gnarled very old frangipani tree. The tree is sacred, and the flowers are used to make homage to the gods. Frangipanis are often found in Balinese temples, and like the one at the Elephant Caves near Bedulu can be immeasurably twisted and ancient. This tree grows out of a square plot marked *K* on the drawing on p. 150, which is not set out square to the temple, but angled to its axis. When one stands behind the tree and sights along the axis of the plot it is visibly oriented to the outlet *T* and the westernmost rocky island. Here is yet another axis through the outlet, which is subtly emphasized around the tree by angling the enclosing plot to the axis rather than to the walls of the nearby temple.

Now each of the five small islands has been linked through *T* to some significant point within the precinct:

- (i) the large island Gili Topekong to the island in the lake;
- (ii) the small rock to the back corner of the Hariti compound, *R* on fold-out map;
- (iii) the next island, Gili Kambing, to the Hariti gate;
- (iv) the tall rock surmounted by a tree, Gili Mimpang, to *S* and the statue of the god Hariti; and lastly
- (v) the cluster of rocks to the frangipani tree *K*.

<sup>10</sup> Bagus Oka tells me this may be named after a Chinese God.

In the Hariti enclosure there are two banyan trees, the most sacred tree in Indonesia. They do not seem to be more than 100 years old, and without knowing the date when the temple was first placed here we cannot know which came first. But they exactly straddle the main axis from Hariti to Nusa Penida at an angle which lies halfway between that of the front wall with the gate in it, and the bottom of the central flight of steps. The trees were at one time surrounded by a circular stone wall which is now almost completely hidden by the tangle of aerial roots which have shrouded its trunk. If the banyans came first the gate and the statue of Hariti were set out from them; if not it would have been vice versa.

We should not be surprised that trees were planted with the same ceremonial care as altars and shrines; it would only be natural for a priesthood who worked so sympathetically with the salient features of the landscape to be equally responsive to the forms of the rivers and trees and lakes, and to be as deliberate in placing important trees as they were in altering the outline of the marsh or in cutting back the hill. For the shrine of Hariti is buried deeply into the hill, so that some 18m. of soil overtops it, while the Shiva temple perches on top of the cutting. With greater labour the entire hillside was scooped out, whereas the temple could have been more easily placed on the side of the hill with much less expense. If it had been moved forward it would have lost the axis through *T* to the islands, unless the outlet could have been moved to the west.<sup>11</sup> All the other elements would have to have been moved to retain their positions, and while this might have been conceivable if the Hariti temple was the first to be set down, the fact that it was not done suggests that the Shiva-*T*-island axis was established first, and the lower temple added later.

After trying a number of different sequences in which the geometry could have been evolved, working each time from a given fact to a derivative point, I strongly suspect that the Shiva temple was set out first on the intersection between the Gumang-Glagor axis with the axis square to it set on the island of Nusa Penida, and that the fortunate position of the marsh, the creek flowing into it, and the offshore islands enabled the architects to enlarge the primary basic geometry to include a much larger area.

The later positioning of the secondary temple would then have evolved naturally from the earlier geometry, and its orientation to the other end of Nusa Penida would have formed a harmonious balance to the axis from Shiva. To increase the geometric links with the older work they excavated deeply into the hill, ultimately endangering its stability so that much later a tree above the cutting crashed down and destroyed part of the shrine.

Step by step, then, a more complex and intricate geometry was built up, possibly over many centuries, each generation adding something to the richness and meaning of the total fabric. Each time a builder made an addition or rebuilt some part he would seek the direction of an experienced priest who would consider the landscape and the existing temples, meditate on the facts of the place, and without any need for a master plan, or even a record of past instructions, could formulate a new form that would grow naturally

<sup>11</sup> Note that *S* is not exactly on the axis to Gili Mimpang. In fact it runs through the tree behind the shrine, and continues to the edge of the platform in front of the carved figure of Hariti. Hence my suggestion in note 9, that the shrine was moved forward when the road was built, and perhaps the Hariti statue was moved back when the tree collapsed. Today's gurus may not be as aware as their predecessors.

out of the old. It is one of the great advantages of a traditional culture where the assumptions and concepts are accepted over many centuries, that such a complex could grow, like all living things, out of its own needs and laws, without having to be the work of a single artistic genius. Each generation built on the work of earlier ones with a rare constancy and a sympathetic empathy for the "reasons" which had impelled earlier men to build as they had, far removed from our post-Renaissance tradition with its emphasis on personality. Such men are not impelled to dominate every task they touch, but to be respectful to the validity of ideas that have gone before. Their work was evolutionary rather than revolutionary, natural rather than individual. We might say that at its essence it was more truly sacred.

I suspect that the web of geometry laid over the small area of Tjandidasa is only a microcosm of what may be found through the rest of Bali. I had neither the time nor the resources on this trip to investigate this thoroughly,<sup>12</sup> but in the hope of rousing interest in the subject I worked over the military map to see what might show up. In thin lines on the drawing I have noted the axes from Tjandidasa. North and south from Bukit Glogor there is a chain of sharp edged mountains rising to almost 600m. Line *A* joins temples 1 and 2. Line *B* from 2 to the salient hill south of Glogor joins 2 to 3, and includes one of the great six Balinese temples—Andakasa marked 4. Line *C* joins this hill to the temple east of Tjandidasa—the Pura Gumang—and one more of the great temples lies on this: the famous, and perhaps the first, shrine of Sileyutki, marked 5.

Another great temple, another of the six, Lempujang on the other side of the island, is sited on the side of a high mountain—6 on the map. Draw the line *D* between it and the Pura Gumang and it will pass through the Pura Meru, or the main temple of the capital of the region, Almapura. This town was once called Kangarasem, and is marked 7. 8 is the nearby Pura Susuan which points directly towards the eastern tip of Nusa Penida, as anyone can see by standing in the inner compound and looking directly through the three precinct gates. Further, the axis down the centre of the temple, *E*, is bisected by the line *F* which joins the other end of Nusa Penida via our old centre Pura Gumang, to the Pura Susuan. This illustrates that the axis need not always be on the most direct visual track, but can pass through (or should I say over?) prominent salients which therefore act as centres rather than terminals. Does this apply to Bukit Glogor and Lempujang as well?

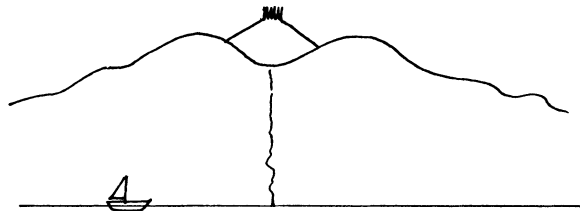
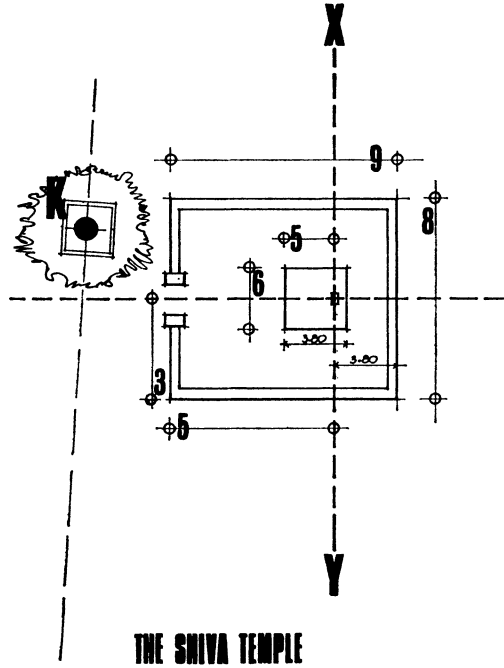
Working from the map I could not find any centres passing through the mother temple of Besakih, or through the sacred mountains of Agung or Batur. Even the temple of Batur overlooking the crater points to the north of it, though the temples in the plain around the lake are oriented to Pura Batur and the lofty Gunung Abang behind. It may be that the web of interlocking geometry covering the island fails to cut through the major homes of the gods. Perhaps the most sacred parts of Bali are too important for anything to be pointed at them.

In the area around Ubud there are few prominent topographical features, while the rivers run swiftly in deep canyons. Most of the temples in this region are oriented to the north, though there are exceptions. Once out of these gently sloping ricefields as the surrounding hills begin to appear over the tree tops, the temples begin to lose their solar axis

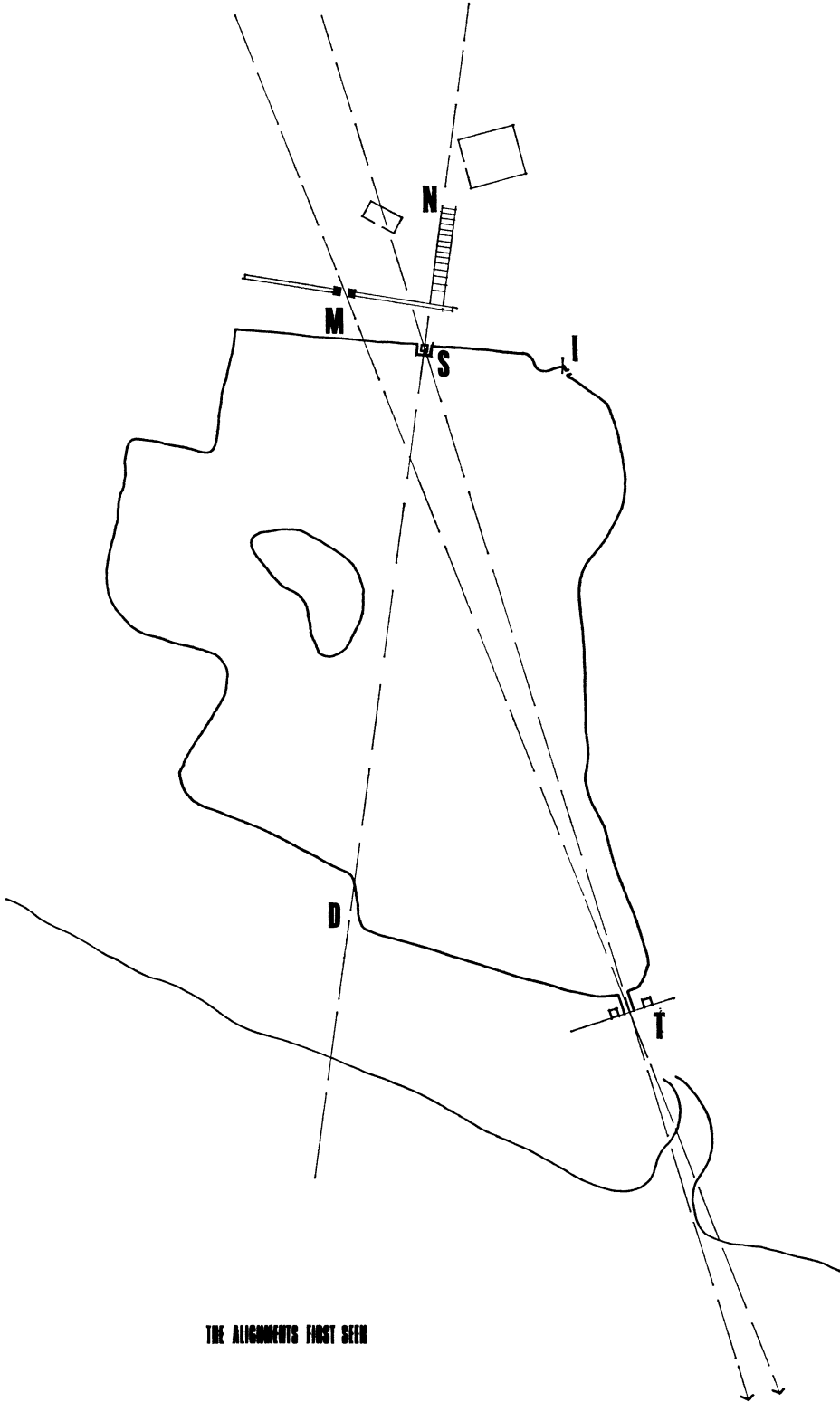
<sup>12</sup> *Bali*, 12—there are over 20,000 temples in Bali, and over 4,660 of these are major sites.

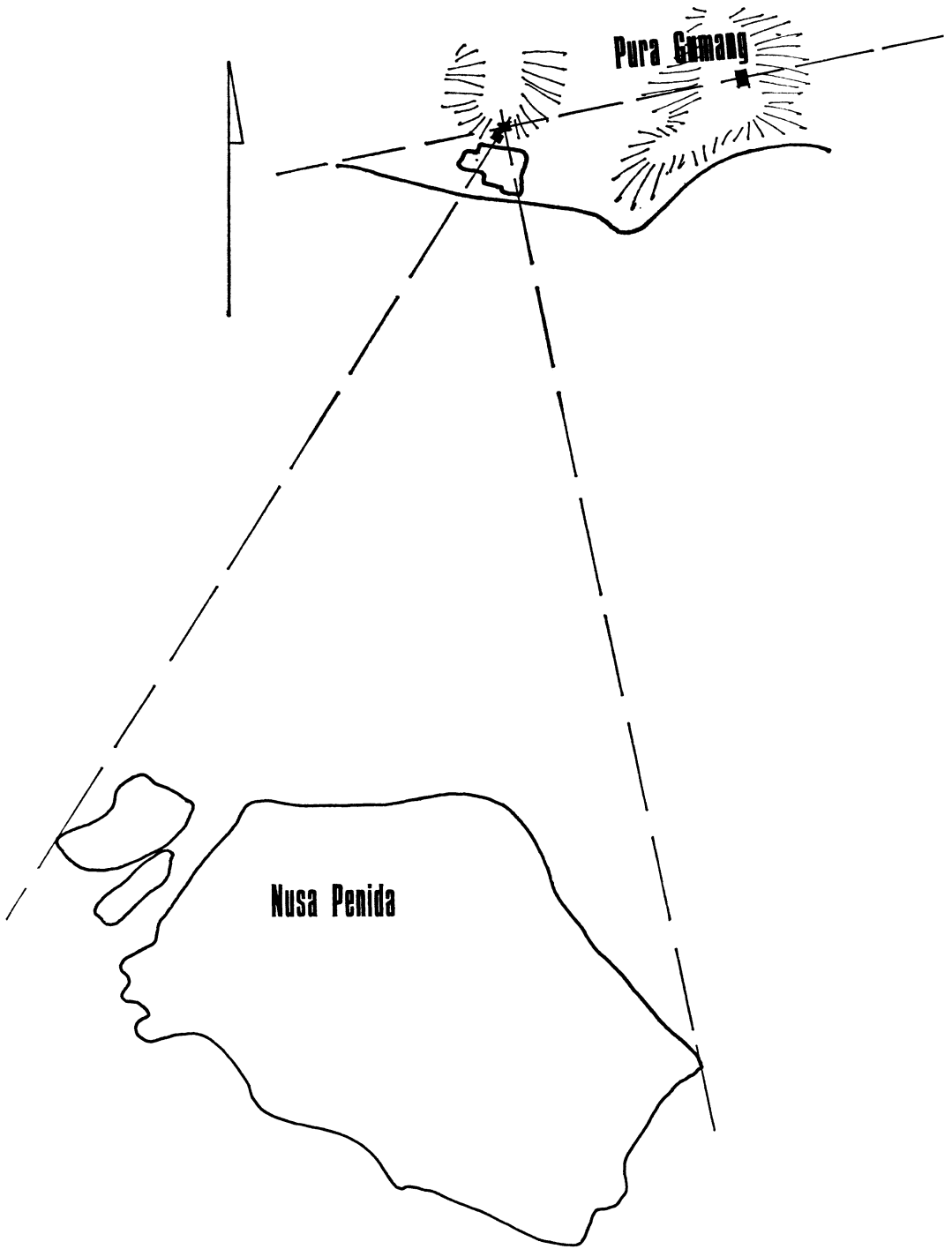
and revert to the topographical geometry found at Tjandidasa. Is this only because the land is flatter, or was Ubud in the past, as it is now, the centre of a distinctive culture, with a different technique for setting out religious sites?

But these thoughts are now too tentative. The axes at Tjandidasa are tangible to the eye, and I hope I may have provoked other scholars to go deeper into the geometry of this island. If it is to be found in the south-east corner in such richness, not only may we find it elsewhere, but it may help to disentangle the early history of the area. It may suggest a hierarchy of sites from which lower or later temples derive, and may suggest the order in which the geometry of the landscape, and therefore its early history, evolved.

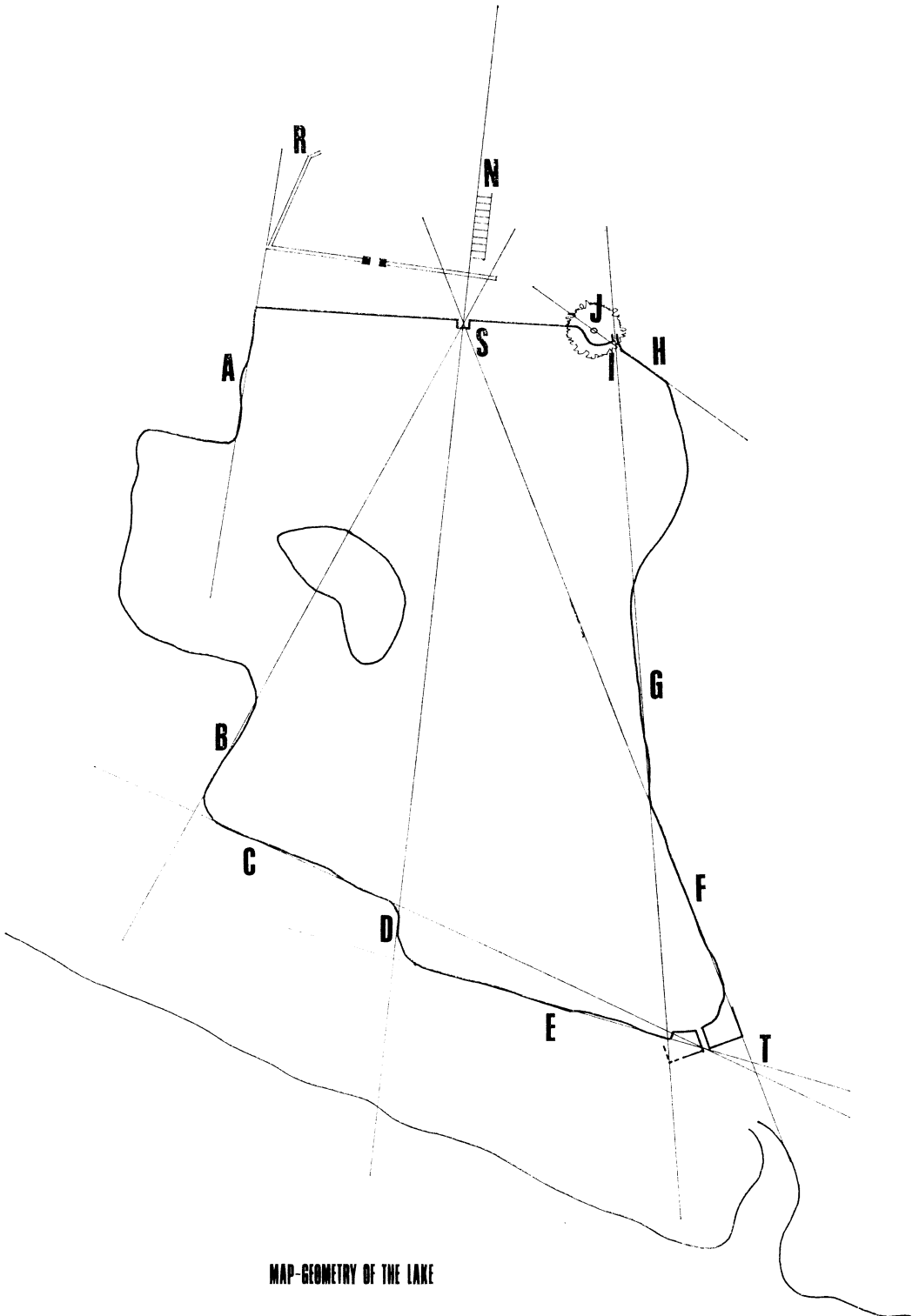


VIEW TOWARDS BUKIT GLOGOR





**THE THREE PRINCIPAL AXES**



MAP-GEOMETRY OF THE LAKE









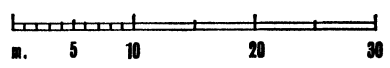
BUKIT BERAGAH

Well

LAKE OF TJANDIDASA

West End of Mesa Parida

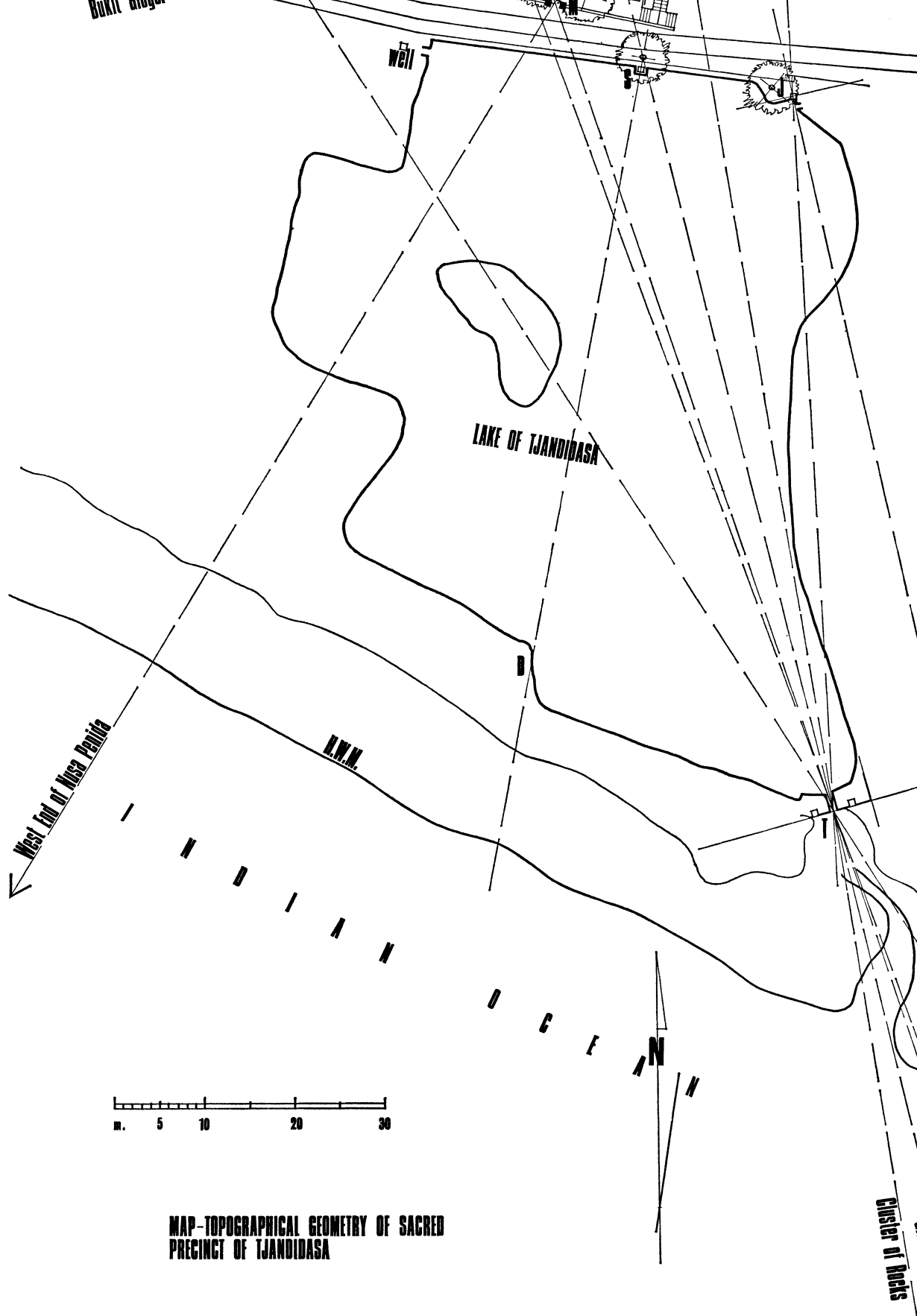
H.W.M.

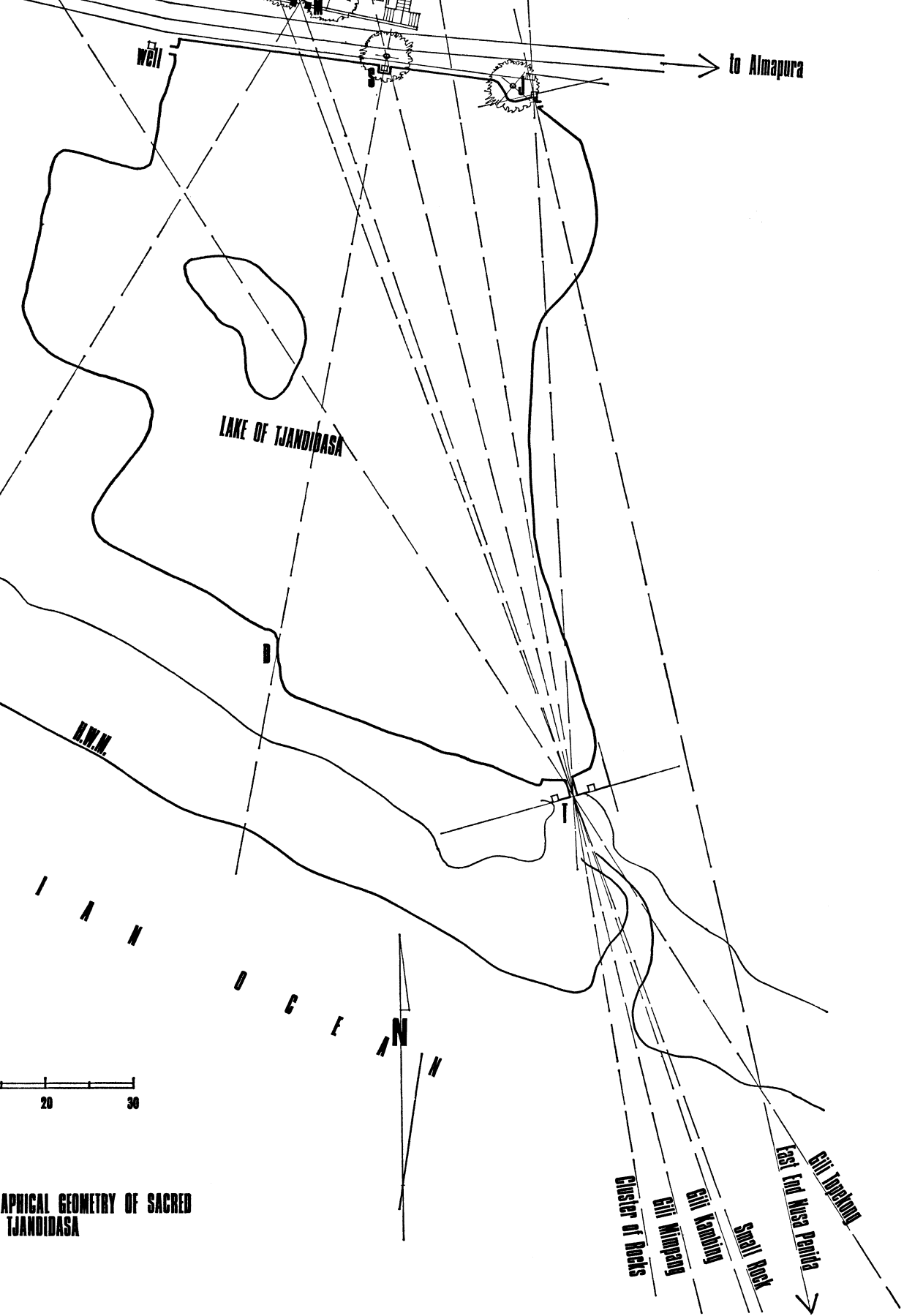


MAP-TOPOGRAPHICAL GEOMETRY OF SACRED PRECINCT OF TJANDIDASA



Cluster of Rocks





**APICAL GEOMETRY OF SACRED TJANDIDASA**