DISCOVERY OF SUBMARINE PYRAMIDS OFF YONAGUNI IN JAPAN

by

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Summary

Submarine research using SCUBA and sonic surveys revealed detailed features of a submarine structure (Iseki Point) looking like a stepped pyramid off Yonaguni in Okinawa, Japan. It stands under approximately 25 meters of ocean, tentatively named Yonaguni Submarine Pyramid or Yonaguni Pyramid. Yonaguni Pyramid is the biggest one among fabricated, underwater structures off Yonaguni whose appearance and size are similar to the biggest ancient castles such as Shuri and Nakagusuku Castles in Okinawa Island, where they are called 'Gusuku'. Essentially, it has a cliff face like the side of a stepped pyramid, and dimensions of about 290 m (length) by 140 m (width) by 26m (height). Flat terraces, straight walls and its surface structure of walls with scars of tool marks driven in by a wedge on the structure are identified to be artificially fabricated. Surrounding the structure, 9 roads associated with drainage canals were recognized and a retaining wall along the road that is composed of huge rock fragments, and entrance to the ruins are further evidence. They show that the pyramidal structure has not been manufactured by nature. On the other hand, the five-layer structure was man-made. The formation age is estimated to be about 10,000 years ago based on ^{14}C and ^{10}Be age determinations. Ancestors of the people who made the structure may have migrated from the continent or a southern paleo-land by means of the land bridge during the last glacial age.

Unknown topography found off Yonaguni

Recently, many submarine configurations looking like artificial ruins have been found in the Okinawa islands in Japan (fig. 1) (1). Off Yonaguni Island, there are many artificially fabricated configurations beneath the sea. The biggest and most elaborate one is called Iseki Point (=ruins point) (fig. 2). Part of it may have been known by fishermen about 60 years ago, and then a local diver found it in 1986 while looking for new leisure diving spots. He called it "Iseki Point" ("ruins point") because the appearance is similar to ruins (2). However, it has been believed to be a natural phenomenon. The whole shape was never known until our scientific dive team, "Submarine Research Group of the University of the Ryukyus" conducted detailed surveys.

Detailed surveys such as SCUBA diving and sonic sounding using SEABAT with multi-narrow beams have been carried out in the ruins sites by the Submarine Research Group of the University of the Ryukyus since 1992 (1 and 3).

Discovery of a submarine "gusuku" pyramid

Iseki Point is located off the southern coast of Yonaguni Island, about 100 m offshore from the Arakawa-bana Cape. Our surveys revealed the whole shape and specific features. Three-dimensional maps of it were created. Based on such data, a shape of a kind of stepped pyramid (4), or fortress, with steps running up its sides appeared (fig. 2). It is a rough rectangle, about 290 m in length, 150 m in width and 26 m in height. It lies about 25 m deep in the water and 1 m above sea level. The upper terrace can be found at only 5 m deep in the water.

Structures such as flat terraces, straight walls, and the surface structure of the walls are formed by cutting a huge, monolithic mass of sandstone (fig. 3). These strongly show characteristics of being constructed by humans. It seems to have been fabricated on the land and then been submerged underwater. Its cliff steps resemble a stepped pyramid. In reality, the overall features of Iseki Point especially resemble Shuri and Nakagusuku Castles, called "*gusuku*" (Fig. 4) in Okinawa Island. Those gusukus were resistered as World Heritage Sites in 2000.

The appearance of the gusuku in that they have stepped, stone structure seems to be a pyramid. However, there is a little difference between them. The walls of Iseki Point are monolithic while gusuku's walls are

Fig.1: Location of Yonaguni

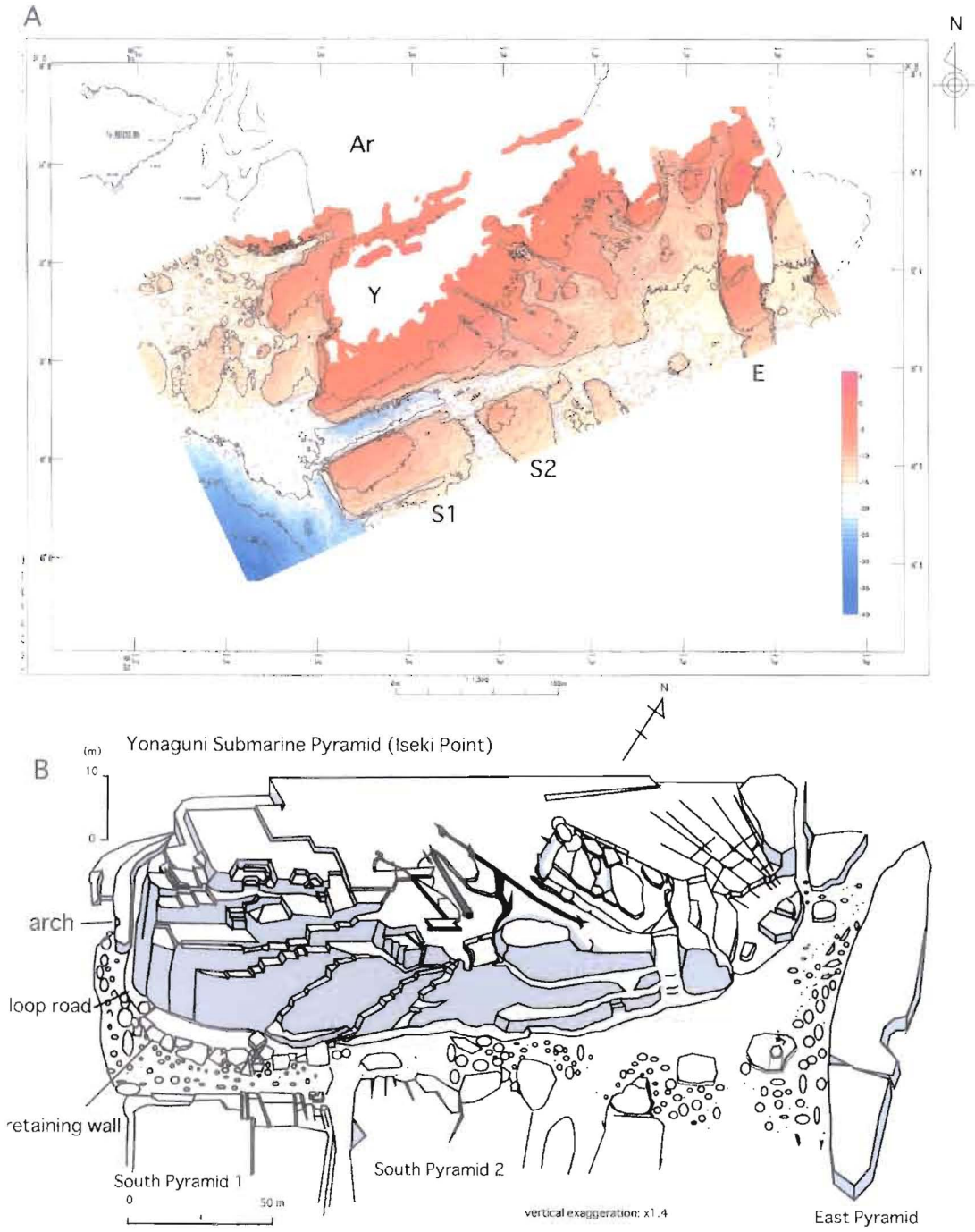


Fig.2: Submarine topography by SEABAT measured (A) and compiled topography of Yonaguni Submarine Pyramid (B). Ar: Arakawa-bana Cape, Y: Yonaguni Submarine Pyramid, S1: South Pyramid 1, S2: South Pyramid 2, and E: East Pyramid.

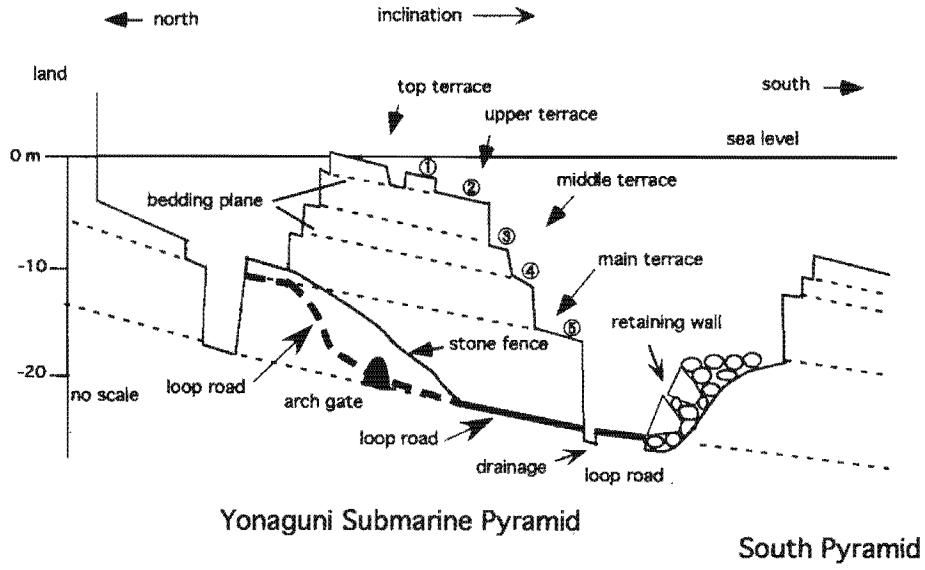
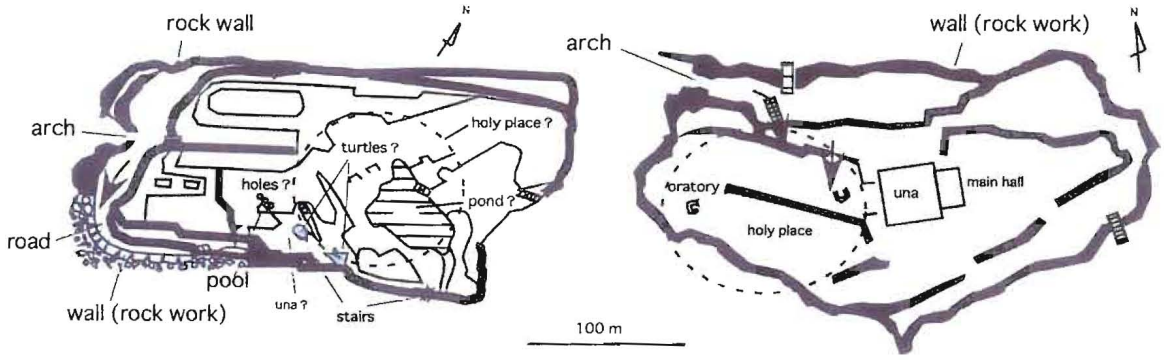


Fig.3: Schematic cross section of the pyramid and its vicinity

constructed by laying regularly shaped rocks. Any way, it is sure that features of Iseki Point a kind of pyramid (4). Therefore, Iseki Point is tentatively named "Yonaguni Submarine Pyramid" or "Yonaguni Pyramid" as a field name.

Detailed analyses revealed that Yonaguni pyramid is a monolithic structure composed of layers of sandstone and mudstone. It would be relatively simple to separate the layers and move them apart. They are separated, fractured, and slipped to make flat terraces and straight walls. This was the condition of the stair-like formation we surveyed. Therefore, it would seem to have been formed by nature at the first glance (5-8), though many believe it man-made (9-12). Our surveys revealed that the overall shape and features of Iseki Point are greatly similar to "gusuku" in ancient Okinawa, Ryukyu. There is a tunnel in front of Yonaghuni Pyramid similar to the arch gate of gusuku (fig. 4). Also, a pool similar to "Kaa" (= artificial spring, for drinking water) is observed, and holes for pillars (?) are found (fig. 5).

Gusuku have been thought to be something like a combination of a castle and a temple.



Yonaguni Submarine Pyramid

(Iseki Point)

Shuri Castle gusuku

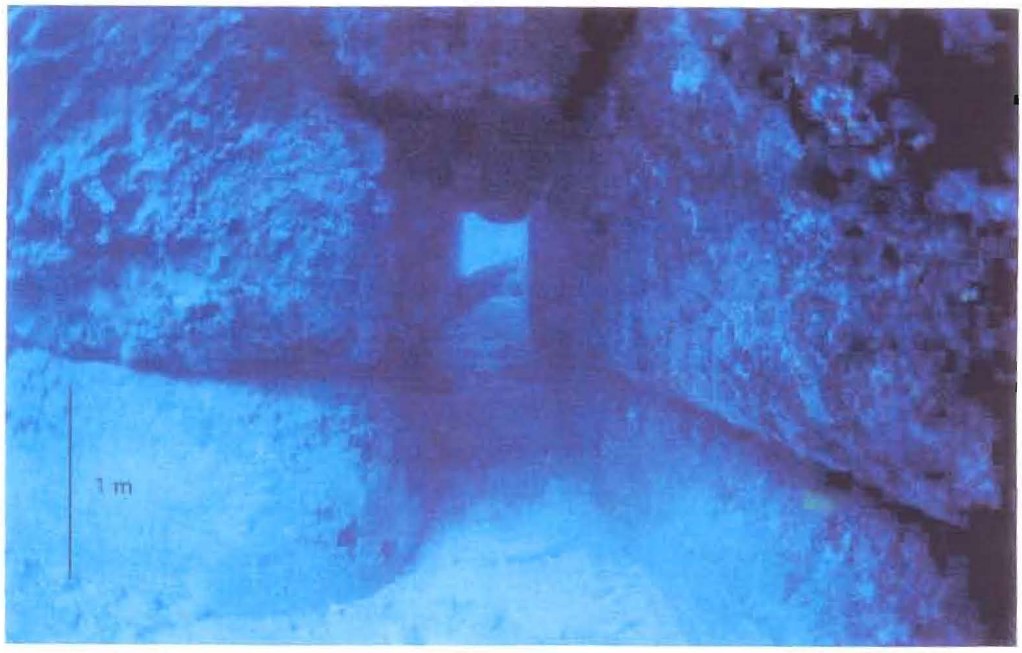


Fig.4: Correlation of Yonaguni Submarine Pyramid with Shuri Castle gusuku (top). Gate of the Pyramid looks like arch gate of a *gusuku*.

A

B

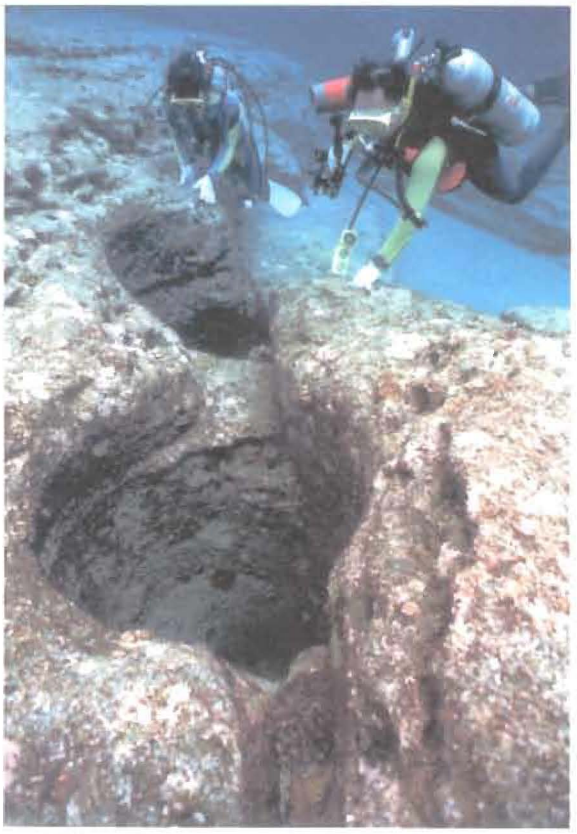


Fig.5. A: Upper terrace of Yonaguni Pyramid. A fan-shaped pool, similar to the artificial spring in the *gusuki* pyramid. B: Large holes, possibly man-used, at pool side. Photos by K. Shindo.

Now that there are only their stone walls remaining, most gusuku look like a sort of a pyramid.

Terrace formation

It is difficult to explain the formation process of the shape of terrace by natural forces. The rock layers composing Yonaguni Pyramid (Iseki Point) today are inclined 10-12 degrees southeast, and it is possible that tidal currents and wave action pulled them apart, and they slipped southward with the help of gravity. However, there are also terrace-like formations on the west and east, and north (figs. 3). These are difficult to be explained away by nature and gravity.

At the upper terrace of Iseki Point, there is a formation that looks like a fan-shaped pool, already mentioned (figs. 5-A). Its walls are 2 m high, and for some parts they are perpendicular and other parts not. For a feature of this shape, where there is no domino-like sliding down the slope of gravity by the surrounding walls, the handiwork of man offers the most sensible explanation for its appearance.

It rises nearly perpendicular all the way from 25 m underwater to within a few meters of the water's surface. A natural explanation would require that the same force has been exerted equally all the way up and down and around, but the distributional pattern of natural forces to cut the wall varies from the shallow to the deep. In other words, it shows signs of having been worked on by human beings using stone tools.

No rock fragments can be found at the foot of Iseki Point. Next, we checked the deepest point around Iseki Point to look for fallen rock, rock that would have been peeled off and dropped into the abyss by natural forces. But there was not any. Instead of fragments and eroded debris, the area at the foot of the structure, some 25 m deep, looked cleanly swept (figs. 6 and 7).

Construction works

Road: It is very significant that there is a space that looks like a road, and that it surrounds Iseki Point (fig. 6). The road is curved along the western corner of the Point at the same width of about 6 m. It is very unlikely that this road was formed naturally, since the surface of the road is clear and there are no rock fragments from the pyramid on the road, as there would be if it was the product of erosion. A road surrounding the structure strongly indicates that human beings made the structure, because any

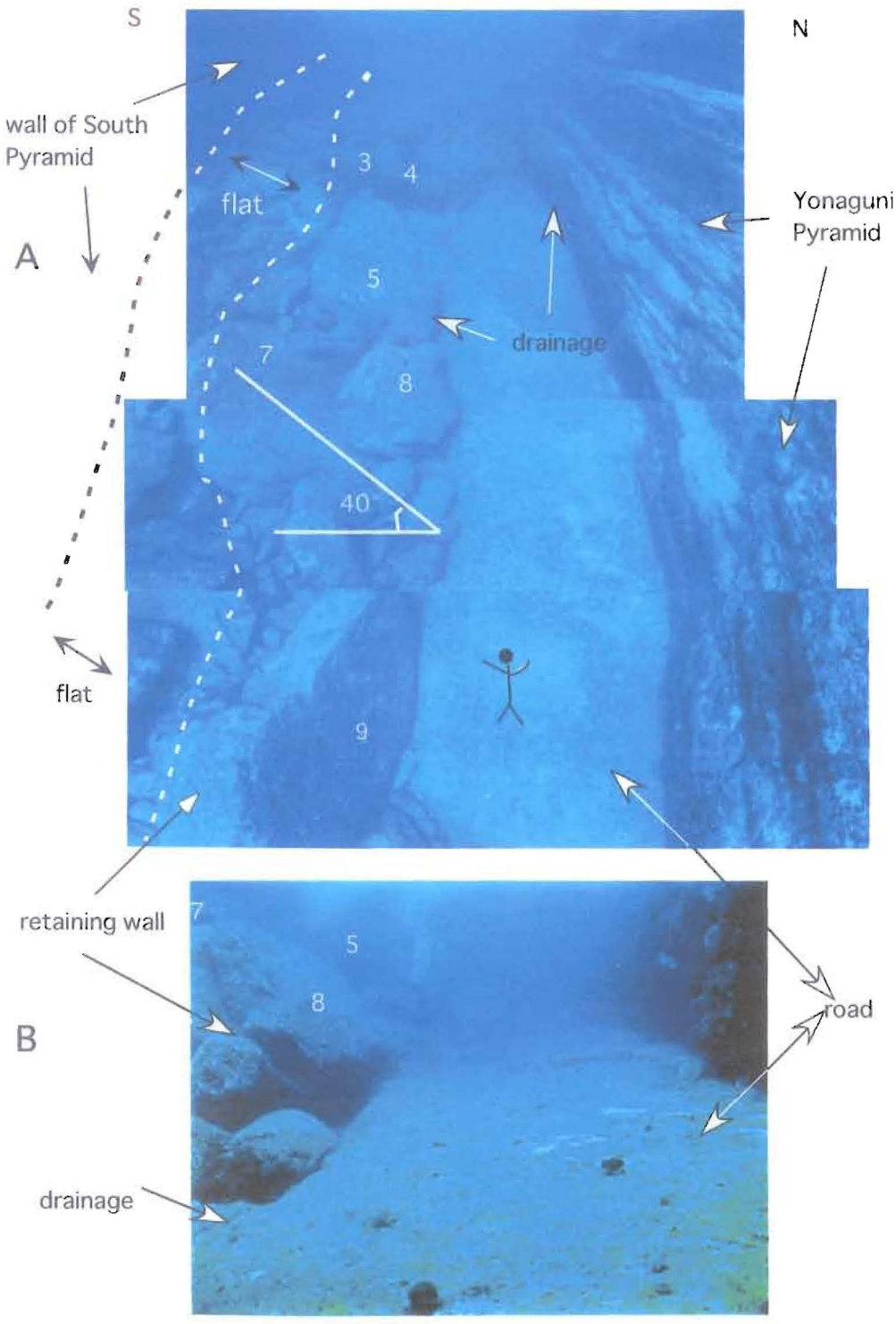


Fig.6: Plane photo of the road southwest to the pyramid (right). There are no rock fragments fallen to the terraces on the loop road (centre of the figure) surrounding the pyramid. Numerals are named for each, giant rock fragment in order to measurement.

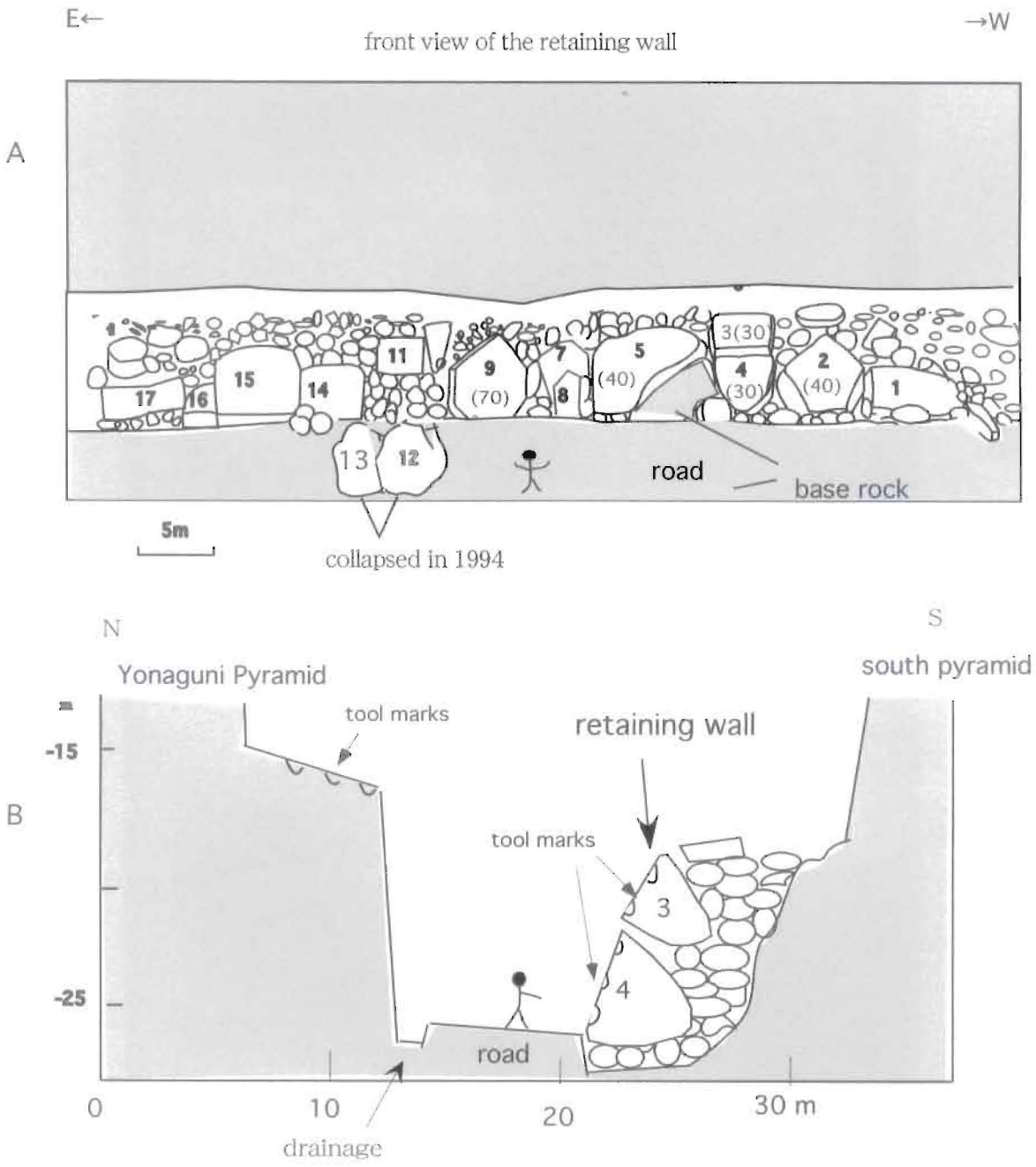


Fig.7: Cross section showing a road, drainage canal and retaining stone wall.

bottom currents never wipe off all heavier rock, weighing as much as 10 tons, from the foot along the structure like fig. 6. Adding to this, the thickest sediment should exist in this place, because it is in the deepest part in the narrow valley topography represented in the detailed map in fig. 2.

Additionally, huge stones, with diameters of about 2 to 6 m are arranged in a row along the road on the other side of Iseki Point, and form what is like a foundation of a retaining stone wall. It is very unlikely that natural current would form a road and a retaining wall surrounding the pyramid.

Add to them several stairways from the road to the main terrace, middle terrace and upper terraces. These seem to be artificially fabricated. (13)

Drainage: Depressions looking like drainage canals are well preserved on the south side of the main site where the loop road is. These are a feature 20 to 30 cm wide and just as deep parallel to the road (figs. 6 and 7). The drain crosses the road at the lowest portion toward the more lower place. It could carry water at a rate of 0.02 tons per second. This is too much volume for such uses as irrigation or "city water", but is a useful volume for drainage (14).

This highly functional drainage canal is still visible on the upper terrace and the summit of the pyramid structure. The pool-shaped feature is a case in point.

Retaining wall: Along the southern side of the loop road, following the edge and going straight up, huge rocks are piled up. The height is about 5 m above the road. Strange to say, huge rock fragments stand a line facing the road. The inclination of the wall is about 40°. However, the zone between the wall of South Pyramid and huge rocks is almost flat or low angle (fig, 6). The profile is seen in fig, 7. These are quadrilateral shapes, and five- or six-sided rubble, piled to heights sometimes exceeding 5-6 m and roughly fitted together, although they appear random at a glance. At the southern margin of the road has a straight wall cutting down to the south as drainage. The huge rock fragments are set along the outside of the cutting wall, and they are distributed in a single row.

Most of them are at least the same dimensions or longer than their front-facing side. The shape of the huge rock fragments accords with what modern stonemasons call the "*hikae*" (counterfoil) and "*tsura*" (face),

and besides that, there are tool marks as mentioned later along the edge of the face (fig. 7). This is interesting to note because the "*tsura*" part facing the road angles back, away from the road, at an angle of 30° to 70°, 40°on average, along the down side of the wall along the road. That the bottom part of each corner stone is a wide flat shape, solidly seated in a bed of smaller, rounded stones, also abides by present-day building wisdom. A smooth, clean line follows the edge of the road, scooped out to hold the foundation stones firmly in place. That is, those huge rocks are identified as corner rocks of the retaining wall.

Thus, Instead of setting the huge rocks directly on bedrock, they are seated in a bed of gravel, and backed by small stones. In modern terms, "*Uragome-ishi*", both are recognized ways to keep road and wall well drained (15). On the far side of the road from the wall, the south side, the indentation following the curve of the road would provide proper drainage for the road.

Very important evidence for calling it an artifact is seen. That is, two kinds of rocks such as angular and rounded ones compose of the wall south of the road. Huge rocks belong to the former, and they are put facing the road. The latter is smaller and they are set beneath and behind the former. one

It is very difficult to explain this relationship, because formation processes of both ones are quite different. The former may be from Yonaguni Pyramid, the latter may be from river side or coast. Thus, both have definitely different origin. Necessarily, it is clearly understood that they were certainly put in place later and arranged by human artifice.

By the way, the width of the wall is about 10 m and the length is about 100 m. The volume of the piled rocks is estimated as less than 5,000 m^3 including rounded gravels. On the contrary, volume of peeled rocks is estimated as 10,000 - 30,000 m^3. Therefore, most of the retaining wall should be esasily filled by rock fragments derived from Yonaguni Pyramid.

Based on mentioned above evidence, huge rock fragments are identified as corner stones of a retaining wall, and their corners show the traces of *kusabi* or such kind of stone-cutting-tool marks (fig, 7) where they were cut to fit together as mentioned later. Therefore, they should be considered a man-made construction.

Tool marks

Scars of tool marks driven in by a wedge and

others on the structure have been found. It strongly supports the idea that this formation shows the hand of man in its construction. "Kusabi" is the name for the wedge-shaped cutting tool used by other ancient peoples in the same Pacific cultural sphere that Iseki Point is located within. We found them in abundance. If you look at fig. 8, A and B, you can see them, too. The upper photo shows the western side of the flat surface, the upper terrace, and the second one is a photo of the corner edge on the eastern side. Look where my left hand is in the picture. It looks like half of a funnel shape. These funnel-shaped depressions are evenly spaced from 20 to 30 cm apart. They are essentially the same as the tool marks that can still be seen in a quarry on the main island of Okinawa at Minatogawa.

Having once identified these marks, we began to find them everywhere: on land at Sanninu-dai and 15 meters underwater on a megalith we nick-named "Sekihi (monument) Stone". There we counted more than 70 rectangular cuts lined up at even intervals on the Sekihi stone (fig. 8-c). We made plaster casts of their distinctive shapes to show to marine biologists, who confirmed that these holes are not the work of creatures such as sea urchins.

Back on land, we took a look at a place called Hikawa Beach, where any number of rocks bearing similar marks can be found. The only difference between the Hikawa rocks and the others is this: we know that the Hikawa rocks were quarried as recently as 60 years ago. Ancient and modern, oriental or occidental, the basic technique for quarrying rock does not change; it begins with a row of evenly spaced holes drilled into the rock.

As for Yonaguni, the tool marks in stone are the strongest evidence so far supporting a man-made explanation for the structure. Corroboration comes from no less an expert than the director of Okinawa's professional organization for stonework artisans, Kotaro Maza, a man whose work has earned him national honors.

A flat stone in Sanninu-dai on the land bears the scars of stone cutting tools called kusabi, named for their wedge shape and found in the Pacific cultural sphere, and marks that may or may not be remains of ancient written symbols, also were found.

Remains

Stone tools: Two pieces considered to be stone tools have been collected near Iseki Point. They were identified by 13

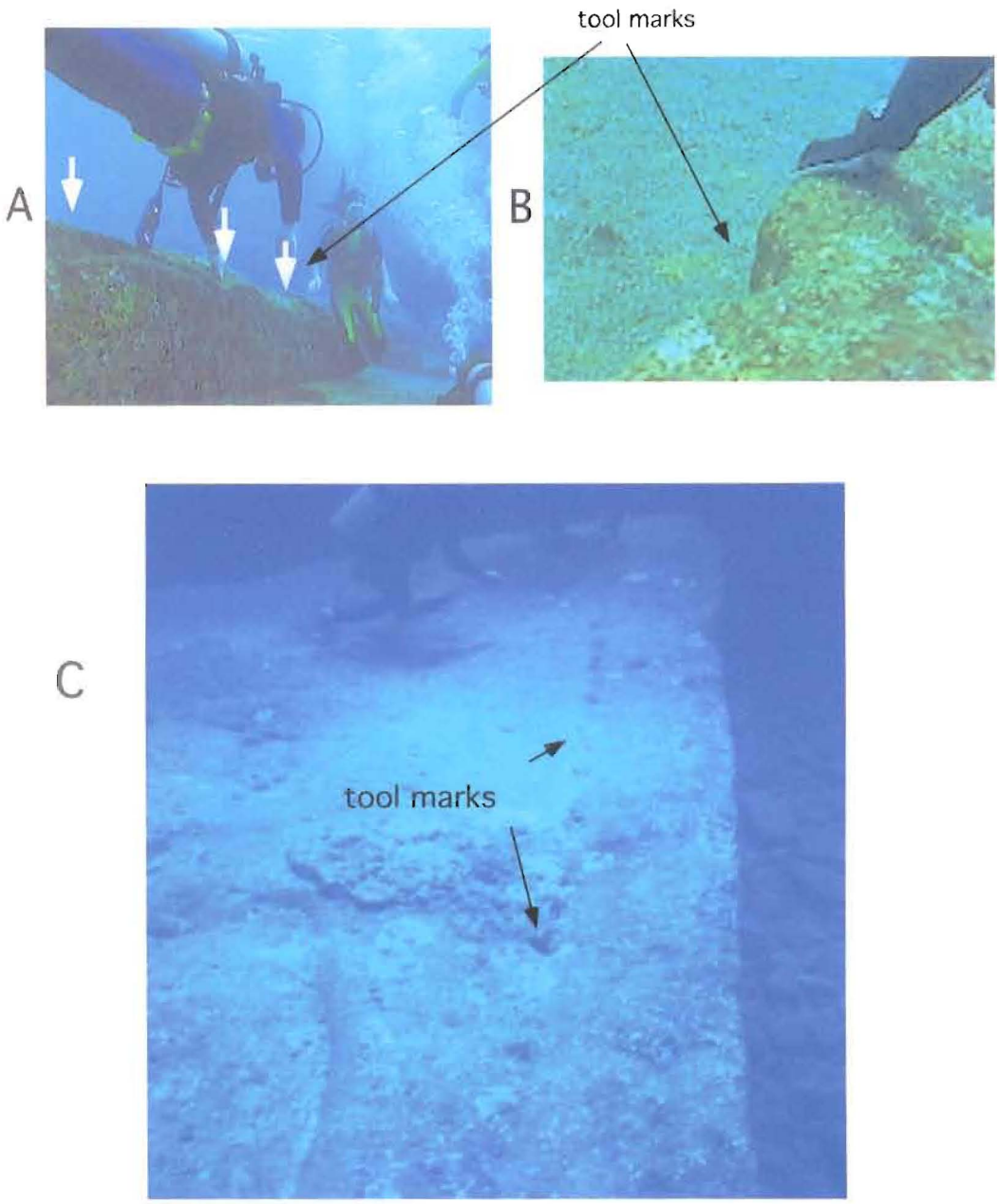


Fig.8:Tool marks for cutting the stone wall at the upper terrace of, Iseki Point (white arrows in A and B). Tool marks driven with edge on the Sekihi (stone monument) Site off Tachigami-iwa.

archaeologists of Japan, Korea and Taiwan. One stone tool was found 1 km northeast of Sanninu-dai in sandy ground 18 m below sea level on June 29, 1999. It measures 16 cm by 9 cm, and is 3.5 cm thick (fig. 9-C). It was made by chipping away parts of sandstone of the Yaeyama Group and it was a tool used for chopping purposes. It is a stone adze, a small hand tool, like an axe. Usually, a simple stone axe has one cutting face, but this one seems to have been sharpened on the sides, too. From the marks on it, it seems that first the shape of the tool was chipped from the stone, and after that the edges were ground away. This could have happened hile it was lying on the bottom of the sea, being churned around in the sand (16). It shows signs of wear, from having been used as a tool. However, another archaeologist commented that the wear and tear shows up only on the sharpened cutting face of the tool. If it were being ground away by natural forces, the wear and tear would show up all over, not just on the cutting face (17).

Besides the appearance of the object, there is appearance of the place where it was found. It was about a 10 m square of sandy ground and the terrain around it includes a steep cliff face, a tunnel, and other complicated formations—not the kind of place where an object that had been carried away from what is now dry land would end up. It looks different from other stone age tools that have been unearthed from Yonaguni Island, so one can not help but think that it is uniquely related to the submerged ruins of Iseki Point.

There is another sample recovered from a place southeast of Iseki Point, at a depth of 15 m in 1997 (fig. 9). This is composed of dark, fine-grained sandstone of the Yaeyama Group, resembling the one from off Sannninu-dai. Over ten archeologists in Japan and Taiwan agree. Top advisors on antiquities looked at it. They were convinced one of the pieces is definitely a stone age tool. There is a comment that tools of this type are often found on the Yaeyama Islands in the same chain as Yonaguni dating from 10,000 - 2,000 years ago.

Archeologists of Taiwan University concurred that our rock samples strongly resembled stone tools frequently found on Taiwan. They are pointed out as a farming tool for chopping up the ground, like a hoe or mattock. The ages are 4,000 to 2,000 years ago.

In any case, the samples we discovered underwater differ from those usually found

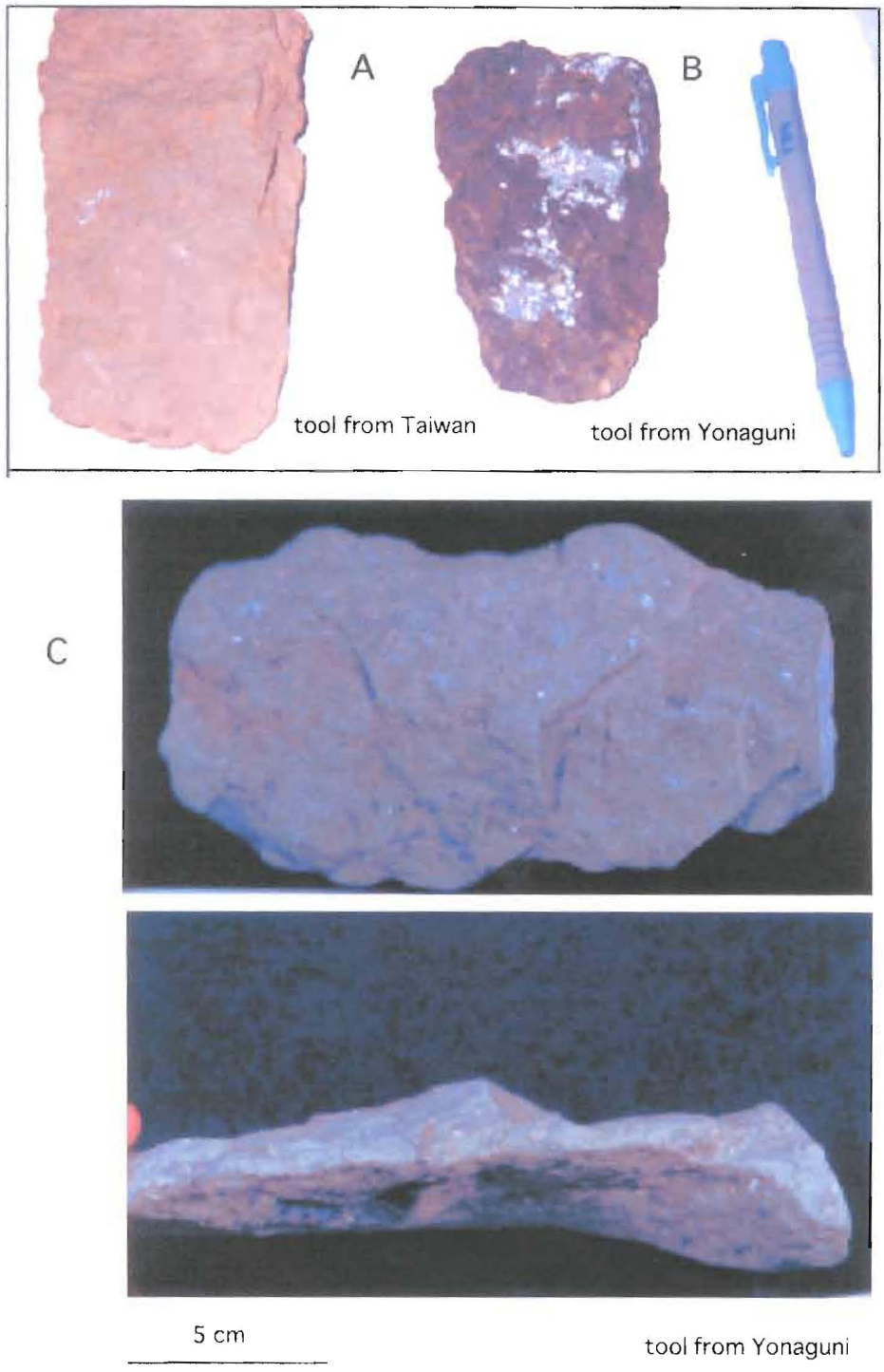


Fig.9: Stone tools recovered from the Yonaguni Submarine Pyramid and its vicinity.

A: Hand ax in Taiwan. B: Adze from the Yonaguni Submarine Pyramid in 15m deep.

C: Stone ax recovered from the vicinity of the submarine Pyramid in 10m deep.

on land, including in Yonaguni, in that the land ones have been ground into shape, but ours were the product of a chipping away process.

That brings up an item found in the Ginama Submarine Stalactite Cave in northern Okinawa Island, its age estimated at from 20,000 to 7,000 years ago (18). It is a type of stone tool, a piece of stone peeled off from a large piece. We are inclined to believe that the ones found on Yonaguni must be from around 10,000 years ago.

All experts said that these are tools used in farming. If those are farm tools, there must have been farms at or around Iseki Point in ancient times.

By the way, in addition to the above samples, we have a collection of other pieces of worked stone, but so far no one has ventured an opinion as to what they might have been used for. Tools? Toys?

Stone tablet carving symbols: An interesting tablet-shaped piece of stone was retrieved from beneath a large boulder at the end of the loop road at the depth of 23 m in December of 1998 (fig. 10). It measures about 24 cm long, and 16 cm wide, and is 2 cm thick. It is made of black shale of the Yaeyama Group, distinguished by very thin black layers, and inscribed on it are two symbols. One looks like a cross mark, or the Roman numeral for ten, and the other like a V, or the Roman numeral five. Those are similar to markings on the "Rosetta Stone of Okinawa that was found on land in Okinawa, the main island. There are also two holes drilled through it, and a vague indentation in the submarine tablet (fig.10).

We examined it for signs of erosion, or some natural explanation for the markings. Geologists and oceanographers who also checked it over found no fractures or fissures that would indicate, or contribute to, natural underwater erosion. That left marine biologists. What if some innocent shellfish had traced the marks or drilled the holes? As the result, the palette-shaped table was identified as an artifact after I discussed it with eleven different biologists and archeologists.

The cross-shaped mark, composed of two lines scratched into the rock, measures 2.7 cm by 1.5 cm. "Clearly, it is a man-made symbol". The reason for that verdict lies in a close-up look at the place where the two lines cross. Just like at a traffic intersection, there are four corners. Three of the corners

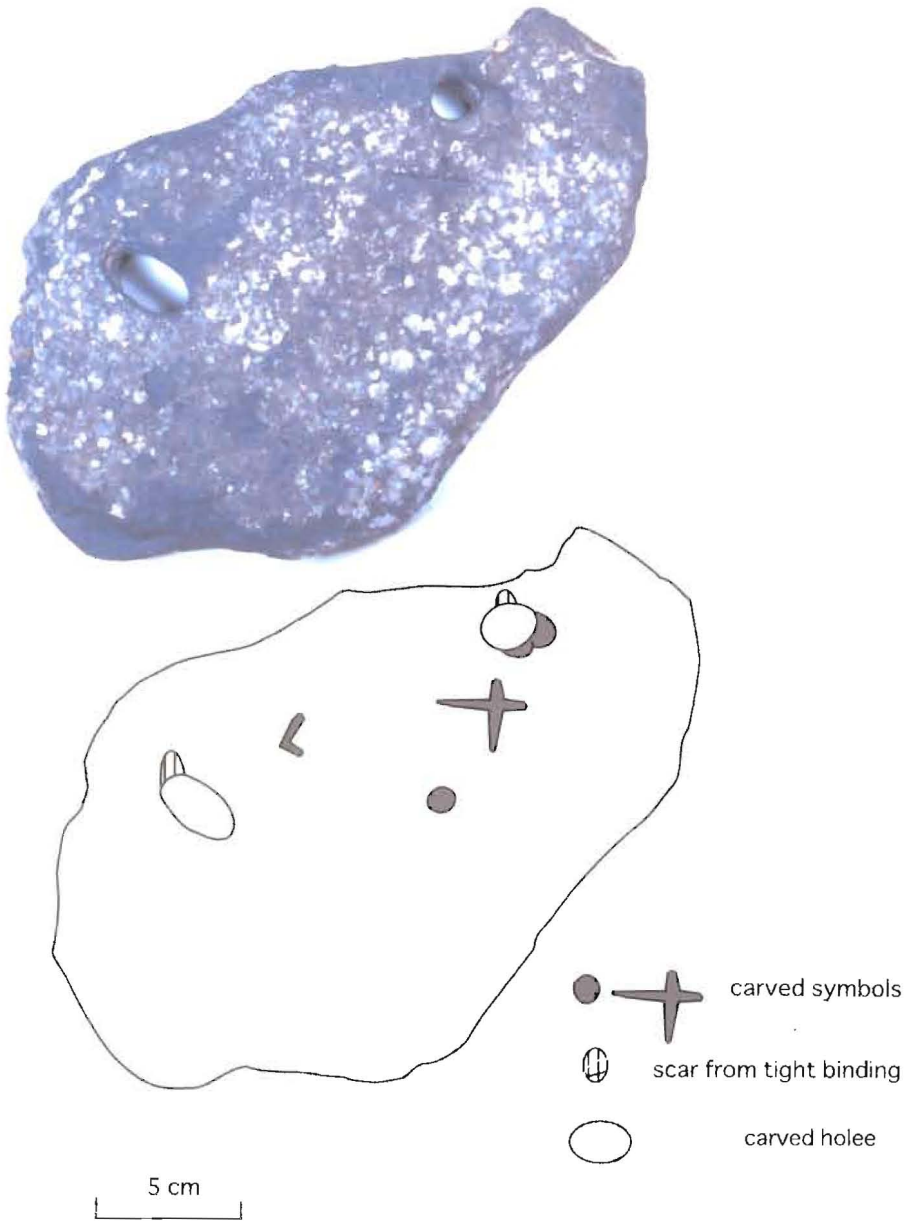


Fig.10: A stone tablet carving some symbols, retrieved a southern foot of the Yonaguni Submarine Pyramid at the depth of 23 meters in December of 1998.

are worn away. One is sharply pointed. That sharply pointed corner is the key point. It means that when the mark was carved, the carving tool was moved in one direction, a hallmark of hand carving.

While I am on the subject of that particular shaped mark, I want to point out another artifact, not from Iseki Point, but an inscribed tablet on display at the Okinawa Prefecture Museum. It is known as the "Rosetta Stone of Okinawa" because of the mysterious writing it bears (17). That writing has several points in common with the palette stone found at Iseki Point.

How much can be seen in a single inscribed character? First, one end of each line is rounded, and is carved more deeply than the other end. Secondly, you can see which line was carved out, and which was carved over. Third, there are traces of a straight, narrow line down the middle of each wing of the cross mark.

While the palette stone from Iseki Point has a generally rounded shape, the "Okinawa Rosetta stone" – even though it is a fragment –shows a layout that tends to be squared, and is much more deeply carved.

Could the palette stone markings not be some kind of trail left behind by a marine animal? The marine biologists consulted say it is hardly likely. No such case has ever been reported. As for the V-shaped mark, the verdict is the same as for the cross-shaped one. The depth and width of the grooves are strikingly similar.

A stone with a large hole and a small hole drilled all the way through – could it be that some kind of shellfish once made its home there? Because of the vertical and horizontal striations, the best guess is that – even if some kind of sea creature drilled the original hole – whatever was there was deliberately enlarged, by man. Above each of the holes, there is a further indentation, both indentations pointing the same way. It looks as if the stone had been suspended from a line strung through the holes, and the stone worn away. If true, that gives the palette stone an "up" and "down".

As for the round indentation, biologists have no firm opinion on whether or not a shell fish might have started drilling a hole. There are, however, marks inside the indentation that indicate it was worked on with a tool of some sort by a man. All things considered, the

specialists who examined this specimen conclude that the symbols and holes are manmade.

Next, let's look at the relationship between the stone tablet and Iseki Point. Here is how we know it was not carried there from someplace else. First, it was pretty well held down in place by a thick growth of seaweed. Now, on the surface, if you overlook the accumulated growths, the lines carved into it look sharp enough to be new. But the color inside the grooves and the rest of the stone does not look any different. What happens if you look at the portion inside the carved-out grooves, enlarged? You see fossilized bits of sea life, and the red earth from long ago. It is this detail that spells the difference between something that has been sleeping for ages beneath the sea, and a recently scratched-out item.

Here is another point of view. Suppose this stone with the holes in it was a kind of weight used by fishermen, and their line snapped and the stone they were using sank. Thinking this may be a worthwhile point of doubt, a survey of traditional fishing methods in the area did show that similar stones are used as weights, with one difference. The fishermen pass the line through just one hole, not two. Remember, both holes show signs of wear, from being suspended.

We went back to the site where the palette stone was found, and searched again. This time, several stones with similar features – holes drilled all the way through and circular depressions-were found. We picked up four new samples. What is more, among the stones that we did find, there were many with circular depressions that were not drilled all the way through. That rules out their use as weights strung from a fishing line. The fact that so many stones of a similar type were concentrated in one place is not entirely natural looking. Perhaps someone collected them, and dumped them in shallow waters, so that they all collected in one place.

Surveys conducted so far have turned up examples of inscriptions on the bedrock surrounding Yonaguni Island. There was no way to get them up on dry land and study them carefully, but with these "portable" samples for comparison, we have been able to conclude that at least two of the others are also man-made markings.

A symbol carved on the basement rock of the sea floor was found in February 1999, at a point 20 m deep, west of Iseki point. It

resembles the alphabet letter "U" and is about 20 cm from side to side and top to bottom. It is scratched to a depth of 1cm or more, not a scar left by erosion and equally unlikely to be a trail left by some sea creature in rock of that degree of hardness. Like the marking on the palette stone, the ends and edges of this groove, too, are cut sharply at right angles, and one end is cut wide and deep, the other end narrows and becomes shallow (20).

The other man-made mark was also found at Iseki Point, on the outside of the tunnel-like formation I call the arch, on the western side at a depth of 15 meters. This is the U-shaped symbol in the photo, about 30 cm in length and breadth. It is an open-ended mark, perhaps closer to a "V" in shape than "U", and because of that, it might possibly be a symbol indicating direction.

All these marks may have been essentially inscribed for the same purpose, and done while the stones and bedrock were dry land. The stone pillars on the west side of Iseki Point also reveal similar man-made "U" and "V" shapes. Sanninu-dai yielded a "T" shape in the depths of the water offshore; and symbols very similar to "Kaida-ji" letters, that is ancient unsolved letters in Yonaguni, (21) are seen beneath. The shallow seas off Irizaki (=west cape) have yielded several examples of carved depressions. And at the "Tachigami-iwa" (=standing god rock), below the *kusabi* tool marks, symbols have also been detected just above the midpoint.

Allowing that these symbols are hand carved, the question remains, for what purpose? Comparing the palette stone, with its two holes from which it was probably suspended, and the cross mark and "V" mark, with the Okinawa Rosetta Stone in the museum shows that both have these same kinds of marks. They are also found in traditional Okinawa tattoo patterns. Are they symbols used in ancient charms? Perhaps the palette stone was used as a kind of amulet to attract good or ward off evil.

Cobble carved in relief of an animal: A big cobble carved in relief in the figure of a four-legged animal (fig. 11) was recovered in southwestern Yonaguni, where the water depth is 6 m deep. It is composed of very fine sandstone of the Yaeyama Group. It weighs 60 kg. Its dimensions are 70 by 30 by 25 cm. From the outline, we can guess that it is either a wild boar or a cow. First, of course there are marks left behind by a carving tool. It is hard to believe nature would have left such a clear outline, in any case. Turning it

Fig.11: A relief of a four-leged animal wild boar?

to get a side view, it is clear that the raised animal shape does not arise from natural fracture lines inherent to the stone. The relief begins mid-layer.

Rock art monument

Two big animals estimated as turtles are carved in relief on the underwater bed rock at the upper terrace of Yonaguni Pyramid (fig. 2).

Also, a submarine statue looking like a "Moai" in Easter Island is found 1.5 km east of Yonaguni Pyramid near Tachigami-iwa (fig. 12). It stands on the sea floor about 15 m deep. It is a standing column of rock 1 km to the east from Yonaguni Pyramid and close to the shore. It is about 8 m in height, and looks so much like a human figure that it has been called Tachigami-iwa, a local name meaning "the God who stands up". At its feet, under the water, is about 8 m high rock reminiscent of "Moai statue" in Easter Island.

Fig.12: A moai-like rock; Eyes with clearly-carved eyeballs hint at man-made origin. Photo by T. Hiraki.

It shows a carved mouth, and eyes with clearly-defined eyeballs (3). It is definitely a man-made construction.

On the coast a giant relief of a bird and turtle are found on the central terrace of Sanninu-dai. The total length of wings are 20m, and its relative height is 30-50 cm from the ground. Their overall shapes become clearest when seen from an airplane as with the drawings in Nazca, Peru. The site is about 2.5 km east of the same Arakawa-bana location that served as a reference marker for Iseki Point.

Sannninu-dai (=Sanninu Tower) itself is regarded as ruins showing pyramidal shape continued from the underwater formation, an impressive feature testifying to the presence of ancient peoples. A fireplace was discovered on the tower. Charcoal in the 2-meter square hollow showed 14C age of 1,600 yr. BP.

Age

The formation age of the Yonaguni Submarine Pyramid, or Iseki Point, can be estimated as about 10,000 years ago based on over 30 samples for ^{14}C and ^{10}Be age measurements (22, 23). Especially, 10Be measurement showed that the point had stood on dry land for a duration of 1,000 years in the past (24). Samples, however, are not enough to determine the final result.

On the contrary, the sample taken from the ancient place of fire in Sanninu-dai showed the age by C-14 measurement at about 1,600 yr. BP. (24). The measurement of 10Be suggested that the formation age of Sanninu-dai is about 3,000 years ago though data is still scarce. It suggests that Sanninu-dai on the land is younger than the submarine pyramid.

What was the pyramid for?

Based on the above reasons, Iseki Point and its vicinity were artificially constructed on the ancient dry land.

The basis for an argument in favor of natural formation has been pretty well swept away owing to the research (25). Adding to this, two underwater stalactite caves were discovered near Iseki Point. Stalactite caves definitely represent former dry land circumstances. We can see that the summit of Iseki Point pokes above the water, and it is reasonable to assume that there would be other artifacts to be found somewhere in the

surroundings that may also have escaped inundation.

If we worked from the assumption that all this was a human contrivance, then the question remains, "What on earth was it for?" On the south side passage, go up the first low step, then traverse the mid-level terrace to the upper terrace. You will have climbed a total of five steps on the south side to do this, including the three that take you to the top. As far as we have been able to ascertain, an approach from the north side or west side takes you to the same place, but in one step, a step as high as 2 m. A human being would need a ladder or stepping-stone to climb up it. Nearby is what looks to be a by-pass (25)

Turning our imaginations loose for a moment, this looks like a strategic feature, and gives rise to the idea that our monument could have been provided with features for protection in case of attack. On the south side, there is a stairway that progressively narrows, then disappears entirely. One can imagine an enemy force racing down it, and suddenly—into the abyss. Even now, here and there in the islands, we can see fortress-castles mentioned as "gusuku" pyramid, with stairways incorporating at least one step that is much too high for a human being to negotiate without help. They call this feature "God's step".

Add to this some of the other submarine archaeological configurations. One looking like a colosseum or stadium is found 300 m southeast from the main pyramid, and at a depth of 25 m. It spreads over a wide, flat surface and is 60 by 50 m in area. Steps, similar to the audience seats, or bleachers, for a baseball game surround it.

Also, there is an another big pyramid "Sanninu-dai" or "Sanninu Tower" on the southern coast of Yonaguni Island. It stands on the coast but the lower part extends underwater to a submarine depth of about 10 m. At the highest point on the island, a place called Urabu-dake that is 231 m above sea level, is a step-shaped formation strongly resembling the submarine ones.

Speaking of unique features, Okinawa has been called "Galapagos of Orient" because there are living creatures peculiar to the islands found nowhere else on earth. One of them is the deadly-to-humans "habu" snake. The existence of that kind of snake on an island plus the fossil record are further evidence that the land was not always an island. They are found on the present-day continental areas and also on the Okinawa

islands. They are not found on the other Japanese islands such as Honshu. It is supposed that they came across the land bridge, and became stranded when the land bridge later collapsed. DNA studies are clarifying the origins of species thought to be peculiar to Okinawa.

A paleo-geographic map was made based on research results including recent manned and non-manned diving researches by "Shinkai 2000" and "Dolphin 3K", both belonging to the Japanese Marine Science and Technology Center (JAMSTEC) (1, 27).

It says that about 200,000-20,000 years ago, the water receded to the extent that the Ryukyu islands including present day Okinawa formed a land bridge from the Chinese mainland through Taiwan and Okinawa Island to the Japanese mainland (23, 26).

Along the land bridge, the Japanese ancestors of modern man may have come to Japan from the Asian continent and/or southern paleo-land (28) . The last land bridge subsided from the northern part since twenty thousand years ago because of crustal movements, and the accompanying sea level change after the Wurm Ice Age. It is also called the Wisconsin Ice Age (Wurm Ice Age), from 70,000 to 10,000 years ago, in American reckoning. Regions where a land area longer than 1,000 km has subsided in the past ten thousand years number only one: this place in the Pacific Ocean.

Tokara and Kerama gaps have subsided at a rate of 1-3 cm per year over the last 20,000 years. The subsidence can be explained by both effects of subsiding of the Philippine Sea tectonic plate beneath the Eurasian Plate, on the east, and of extension of the "Okinawa Trough" which is an active backarc basin, on the west side. This southwest configuration is rare among the oceans of the earth, as is the fact that the axis continues to lengthen. This is also one of the most tectonically active places on earth today.

It is reasonable to think that native people may have formed Yonaguni Submarine Pyramid (Iseki Point), people whose ancestors migrated to Yonaguni along the land bridge.

沖縄県与那国沖で海底神殿の発見

近年、与那国島を含む日本の南西諸島の島々に海底遺跡のような地形が認められはじめている。九州から台湾方面へかけて約 1,000 キロの海域につらなる南西諸島各地では、スキューバダイビングの普及で過去十数年前から謎めいた人工的な姿の海底地形が次々と発見されてきた。丸い石を円く等間隔に並べたストーンサークルのようなもの、階段式ピラミッド状に削られた岩礁、石柱、石畳状の遺構などで、ほとんどが水深 20-40 m ほどの海底に沈んでいる。なかでも、与那国島南岸沖約 100 m に沈む通称「遺跡ポイント」（与那国海底ピラミッド）は、階段ピラミッドを思わせる形態とその規模が壮大なことで知られている。東西約 290 m、南北 140 m、高さ 26 m の岩盤に、数段のテラスや階段、排水施設らしき溝などが彫り込まれ、誰の目にも人の手で造られた遺跡に見える。だが、それは自然の岩体が削られてできているため、この遺跡状の海底地形が自然にできたものか人工的にできたものかの判断がきわめてむずかしい面があった。そこで、潜水調査やシーバットによる音波測量およびサンプル採取を行い詳細な地図作製を行ったところ、これらの形態の多くが自然状態ではでき得ないことがわかった。さらに遺跡ポイント本体や周辺海底からは石器類や線刻石板、四つ足の動物のレリーフが発見された。陸上でも、巨大な鳥の岩刻レリーフが見つかり、今では人工説は否定できないものになった。そのため、県に遺跡発見届けを出した。それでは、この遺跡はいつ誰が造り、なぜ海底に沈んだのか。まず年代については、遺跡本体 20 数か所に付着した貝殻、サンゴ藻化石などの炭素 14 法による測定と数カ所の岩盤を用いた１０Be による測定を行った。その結果、遺跡ポイントは今から 6 千年より古

い時代に陸上で形成され、1、000 足らずで水没したということが推定されるに至った。さらにしぼり込むと、およそ 1 万年前、海面上昇が一時的にストップしたヤンガードリアス期に建造された可能性が強くなり、自然岩盤を人間が整形加工した古代遺跡としては、エジプトの「スフィンクス石像」をしのぐ。現在する世界最古の巨石建造物である可能性もでてきた。しかし、まだ測定数が充分と言えず、年代の特定はむしろこれからの仕事と言える。ここで、水没の原因は、最後の氷河期（ウルム氷期）が終わった約 13,000 年前以降、温暖化で陸部の氷雪が解けて海水面は 100 m 近く上昇してきたためと推定される。そのため、与那国の海底ピラミッドは、地球気温の温暖化にともなう海面上昇によって水没をしたことが予想される。おそらく、世界の多くの地域でも、これらのように数 1,000 年以前の文明は、世界的な後氷期の海面上昇によって海面下に没していると推定される。

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