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For years archaeologists have commented on the occurrence of typically Aegean patterns on the ceilings of a fair number of Egyptian tombs, while musing that they could not see how such patterns were reaching Egypt. Certainly Minoan and Mycenaean potsherds had been found in fair numbers in Egypt; but the designs on the Egyptian ceilings were not the ones used by Aegean potters. To me, however, the particular patterns and layouts seemed strongly reminiscent of weaving --a craft I was quite familiar with, unlike most archaeologists, because my mother was a weaver. If the source of these ceiling patterns were indeed pieces of imported cloth, it would explain why the archaeologists could see no mode of transport, since the cloth itself has not survived.

Indeed not a scrap of patterned textile has survived in the Aegean area from the Bronze Age: Greece is one of the **worst** places in all of Europe and the Mediterranean for the preservation of textiles. So what do we have to go on? For one thing, we can examine what they show themselves as wearing. And what gorgeous textiles they are! In fresco after fresco we see handsome all-over polychrome patterns, the favorite being interlocked shapes like trefoils and quatrefoils.

On the one hand, most archaeologists have assumed, if they thought about it at all, that the scrumptious fabric designs in these frescoes were far beyond the weavers of the day, and hence that the Bronze Age fresco painters had invented the designs to make their pictures look pretty. And of course no such cloth has survived to prove the case either way, because no cloth has survived at all from Minoan Crete. We have, however, an independent source of evidence about what people were capable of weaving--namely, the more general history of European weaving--and it tells us that Europeans of lesser cultures nearby had already been weaving fancy cloth for millennia.

We know from various sorts of archaeological and palaeobotanical evidence, for example, that flax had been in use for textiles throughout southeastern Europe since the 6th millennium BC, and that wool and woolly sheep had been introduced from the Near East shortly before 3000 BC (the end of the Neolithic). At about this time we are lucky enough to get some fragments of patterned cloth from various other parts of central and southern Europe--from the Swiss pile dwellings, the Megalithic passage graves of East Germany, and the pile dwellings of northern Italy. Most of these textiles are patterned with supplemental wefts: one

splendid example is the famous Neolithic linen "brocade" from Irgenhausen, in Switzerland, which analysis shows must have been executed in a minimum of 3 colors, possibly more.

Early in the Bronze Age, as the Minoan era is beginning, we start to see modifications of the looms to adapt them to twill--a technique long used in mat weaving, but now newly adopted for the weaving of wool in a climate with chilly winters, since it allows the threads to nestle closer together, in addition to mechanizing the time-consuming task of patterning.

When we look at the Minoan frescoes of clothing, armed with this archaeological knowledge of the development of European weaving over 4000 years, we see that the patterns represented are both possible and probable. Long before I had painstakingly reconstructed all this textile history, I tried to weave copies of the Minoan designs on my own loom, and found, after much trial and error, that the easiest way to obtain all of them was either with supplementary weft floats, or with twill-based techniques, depending on the particular pattern. After many more years of study, I am finally equipped to say, on the one hand, that these are precisely the techniques we see developing in Europe in the 4th and 3rd millennia, and therefore most readily available to the 2nd millennium Minoans; and on the other hand, that these are **not** the techniques used in Mesopotamia and the Levant, which developed weft-faced techniques such as tapestry, or Egypt, which used only single, shed-bound, inlaid threads for its very scant decoration. (Egypt learned its fancier patterning techniques from the Syrians, and only in the mid-2nd millennium, after Minoan textiles were in full bloom.)

In short, the easiest technique for producing most of the textile patterns in Minoan frescoes, namely supplementary weft float, is precisely the one that can be seen developing in Europe, and it is also one that is **not** attested elsewhere in the ancient world. The other technique, twill, is found a little more widely, occurring in Turkey and the Caucasus as well as in southern Europe. In this whole contiguous area it seems to represent a cold-winter response to the advent of wool, not necessary in the hotter southern climes.

Now that we have established the credibility of the Minoan representations of their own fabrics both from independent archaeological data and from internal consistency, we are ready to tackle the Egyptian ceilings again.

As I was collecting every example I could find of an Egyptian ceiling with Aegean motifs, I began to notice that everything **else** that is depicted on a tomb ceiling, during the long period in question, is to be seen above one: stars, flights of birds, grape arbors depicted as though seen from below, and so forth. Thus, when I happened on an article describing some unusual architectural features at Luxor, I suddenly realized the answer to a puzzle I hadn't even

realized was a puzzle. I had assumed that the Aegean patterns were put on the ceiling because that was the only space not reserved for the all-important scenes of the hoped-for afterlife. But I was wrong.

The ceilings with decorative designs are generally divided into panels, each framed by a yellow-brown imitation of wooden beams. Many of the panels are imitations of typical Egyptian mat designs, and mats are known to have been used on the ceilings of houses to prevent the mud of the roof from crumbling down onto the inhabitants after it dried. Other panels, however, are **not** mat designs, and this is where the Aegean designs occur. The article I had found[1] described the beam-holes for the roof of an outdoor pavilion that could be quickly erected in front of the palace when needed, by inserting wooden beams into the holes and throwing large, floppy coverings such as mats or rugs over the framework. The description matched to a T the elements imitating wood in some of the tombs I was studying. In short, everything on an Egyptian tomb ceiling **was** to be found overhead, and I was looking at painted representations of the colorful undersides of fancy sun-canopies--some apparently made from imported Aegean rugs. The Egyptians themselves, as I said, did not yet know how to make fancily patterned cloth at the time when most of these tombs were built, so one begins to understand why they were so eager to buy up the bright rugs of their northern neighbors, and to attempt to take them along to the next world!

The next question was, could I find any other evidence of this presumed trading operation? What was the route, who was plying it, and what goods were being traded in return?

Here the waters have long been muddied by a peculiar geographical fact: it was very easy for ancient sailors to sail from Crete to Egypt, by running before the southeast trade-winds to cross the great Mediterranean, landing on the coast of Libya, and then rowing along the coast to the mouth of the Nile. But it was seldom possible to return by the same route, because of those same steady trade-winds. Tacking hadn't been invented yet. The chief alternative was to sail the long way around the east end of the Mediterranean: up the coast of Palestine and Syria, west along the stormy rim of Asia Minor to the southwest tip, then island-hopping via Rhodes to Crete--a long haul of months, compared to the mere week or so that it took to get to Egypt!

It was, of course, possible, for a trader to trade his cargo in Egypt, load up, and sail home with it, however long that took. But in fact what seems to have happened was that much of the cargo purchased in Egypt was traded advantageously along the way for yet other things, so that the ship arrived home at last with a very mixed cargo, containing small numbers of goods from all over the Near East: faience from Egypt, glass from Palestine, ivory from Syria, raw metals that had been traded to the Syrian coast

from far inland, and so forth. (This is exactly the sort of cargo found in the newly excavated Late Bronze Age shipwreck off the coast of Turkey.[2]) So in fact we may never know exactly what the Minoan merchant received directly for his rugs.

We do know, however, that it was quite an occasion in Egypt when the Minoans chose to send a trading fleet not just to the Nile delta but all the way up it to the royal court at Thebes, to make friendly overtures to the Pharaoh. Although the Egyptians themselves detested leaving Egypt and much preferred to have others come to **them** to trade, the Egyptian upper-class literati were fascinated by the looks and customs of other peoples, recording them with the zeal and accuracy of anthropologists. So each of the half-dozen Aegean expeditions to the Theban court received splendid coverage in the tombs of the officiating nobles.

And here we see some interesting things. The earliest such embassies recorded are in the long reign of Queen Hatshepsut, shortly after 1500 BC. We see typical cinch-belted and curly-haired Minoans carrying typical Minoan vases, and wearing very short loin-cloths, in plain bright colors with fancy edgings, and with codpieces that the Egyptian tomb-artists didn't understand very well. During the reign of the next pharaoh, Thutmose III, however, we see a change of dress. The grand vizier, Rekhmire, had apparently witnessed an envoy of loin-clothed Minoans early in his life, and proceeded to have this grand event recorded in his tomb, along with other important happenings. (Because the afterlife was so important, noblemen began their tombs as soon as they could manage it financially, so as to be ready at all times for the fatal day.) But late in his long life, the vizier seems to have witnessed a second such embassy of Aegean merchants--and now they were wearing kilts instead of loincloths. So he had his artists carefully erase this one frieze and repaint it to show the up-to-date fashions. Fortunately for us, just enough paint survived from the first version to clue us in to the change. This same, later expedition of kilted Aegean traders, apparently Mycenaeans rather than Minoans, was also recorded by Rekhmire's eldest son Menkheperraseneb. The son in turn lived long enough to record yet another embassy of sailors, but by then the political situation among Mediterranean sailors seems to have changed yet again, because **this** group is as ethnically mixed as the cargo: we see the native dress of Palestine, Syria, and Asia Minor too, all mixed up together.

Among other things, we can glean from these scenes the following facts. First, some of the Aegean porters are shown bringing textiles over their arms, along with the fancy metal goods. Second, the Mycenaeans are shown wearing extremely intricate patterns on their kilts, almost invariably in a red-white-and-blue color scheme. And third, at least some of these kilt designs match those found on the

Egyptian ceilings and/or contemporary Mycenaean pottery--for example the zigzag with little tents under the zigs and zags.

One pattern is of particular interest: I've nicknamed it the "wrought-iron fence motif". It is composed of spirals--a typically Aegean building block--and is often built up by interlocking the spirals (another typical Aegean trick) much the way a wrought-iron fence is. We first pick up a simple version of the design on the walls of an Egyptian ruler's tomb in the 12th Dynasty, that is, shortly after 2000 BC, about the time we find our first fancy Minoan potsherds in the land of the Nile. It stands out first because we have no earlier examples of spiral motifs in Egypt (whereas Aegean artifacts have been crawling with them for at least a millennium), and second because it already has the same diamond and palmette fillers that we will see in this pattern for the next 800 years. To top it off, the spirals are blue, which is another trait of this particular design--elsewhere they are usually white or yellow. The full-fledged pattern, with the spirals thoroughly interlocked in good Minoan fashion, occurs on the ceiling of an almost contemporary tomb at Assiut, where the ceiling looks as though the original canopy had been stitched together from six odd-sized rectangles of cloth, the most splendid one--the one with the spirals--being in the middle.

A particularly nice 18th Dynasty example comes from the Theban tomb of a nobleman named Antef--blue spirals, red palmettes and diamonds, on a white background: classic Aegean red-white-and-blue. The very latest example, from the 19th dynasty, is interesting because it is unfinished and allows us to see how the Egyptian artist broke the pattern down to copy it.

One of the most cogent proofs of the correctness of our interpretation of these Egyptian ceiling patterns as copies of imported Minoan rugs comes from the tomb of yet another 18th Dynasty nobleman, named Amenemhet. On part of his ceiling is a quatrefoil interlock pattern that is unique in all of Egypt. In the Aegean, however, it has a long prior history of development, and is found almost exclusively on depictions of textiles. The most famous example, and the closest match to the Egyptian version, is on the dress of a woman dancing in a garden, from the villa at Hagia Triada in southern Crete--the port from which, apparently, most ships heading for Egypt set sail across the open water. (Remember, they couldn't come back that way!) That is, this design is patently Minoan, specifically a textile pattern, and found on an Egyptian tomb ceiling. How did it get there? The only possible answer is that an Egyptian artist copied it off of an imported Minoan cloth.

The plot thickens when we look at the owner of the tomb. Amenemhet had two important posts. First, he was scribe to Useramon, the vizier who preceded Rekhmire and who hosted an early visit to the Theban court by an embassy of Minoan

traders. Second, he was overseer of the weavers of the Temple of Amon, who made fancy cloth for the officials of the realm including the pharaoh himself. In fact, most of the elaborate and expensive goods that these embassies brought to the pharaoh were stored in the Temple of Amon. So if there was anyone in Egypt who was both knowledgeable about textiles and in the right place to see the cream of the imported cloth from abroad, this was the man. Shall we wonder that he ordered copied onto his own ceiling this particularly lovely and curious design, so as to have it in the next world? Perhaps the piece had even been given to him as a special reward for faithful service. It was apparently not very large.

Another relevant ceiling pattern comes from the tomb of Menkheperraseneb, son of the vizier Rekhmire and himself the overseer of the treasury of Amon (two generations after Amenemhet). At first one could easily miss this simple zigzag and diamond design as an Aegean one, since the publication is monochrome with only the tiniest of color keys, and since Egyptian ceilings are full of diamonds and zigzags--copies of the old native mat-patterns. I spotted it only when I was coloring all my xerox copies so that I could get a better sense of how the Egyptians used color. Normally they use a full 6-color palette of red, yellow, green, blue, black, and white; but this design used only red, white, and blue--exactly like the kilts of the Aegean ambassadors. Looking more closely, I realized that it was quite different from the usual mat patterns--for one thing the lines are much too skinny. Furthermore the border does something utterly un-Egyptian: it changes design in mid-stream. Not only that, but both the patterns and the change are essentially the same as occur in the earliest piece of patterned weaving actually to have survived in the Aegean: a belt-band from Lefkandi, dated to about 1000 BC, where the pattern was evidently the happy result of seeing what else you could do with a supplementary warp-float design, in a contrasting color and fiber on a plain linen ground.

All though this research it had been bothering me that I wasn't finding evidence in the Aegean itself of the preference for a red-white-and-blue color scheme. So one day when I was flipping through an old archaeological journal and noticed some vases that were entirely decorated in red, white, and blue, and in patterns that looked very much like textiles, I stopped to look.[3] They were from Crete, from shortly after the end of the Bronze Age (when most of my research stops). And to my astonishment, there were the wrought-iron-fence spirals that I had also previously failed to locate in the Aegean. Apparently, in the impoverished times after the fall of practically everybody around 1200 BC, the pot painters turned for inspiration to the local textiles that before they had ignored!

I consider all of this proof enough of the hypothesis

that Aegean weavers had been crafting ornate woolen rugs and trading them to Egypt during the height of the Bronze Age, between 2000 and 1200 BC. But I am always looking for more ways to tackle any open-ended problem. At the first TSA meeting two years ago, Dorothy Washburn presented her very interesting method of analysing the symmetry types of one- and two-dimensional patterns, and using them to track influences from one culture to another. The general idea is that in early times, each culture gradually developed its own repertoire of patterns, showing a marked preference for a rather small number of symmetry types. Then, as outside influences began to impinge on the culture, the symmetry types of neighbors might be added to the native stock. In a considerable series of articles and in her book,[4] Dorothy Washburn has shown that such additions are quite noticeable, even traceable, in a variety of cultures. I decided to see if I could get any further corroboration by applying this method to the ceiling patterns.

What I needed was to collect a series of Aegean designs and a series of Egyptian designs from the period prior to any trade between the two areas, so as to find out what the native preferences of each area were. Unfortunately it has been very hard to find examples of 2-dimensional patterns for that early period in either country, since the Aegean people did not begin vase-painting in earnest until about 2000 BC, and learned to paint frescoes from the Egyptians themselves; while the Egyptians seldom painted their vases, and filled their frescoes almost exclusively with scenes of people and animals until they began copying Aegean rugs onto their ceilings! Catch-22.

For one-dimensional patterns I fared a little better. Both cultures show a native fondness for **pmm2** symmetry, that is, patterns symmetrical across both a vertical and a horizontal axis; and nobody liked patterns with only glide reflection (**p1a1**). On the other hand, the Egyptians specialized in patterns mirrored across only a vertical axis (**pm11**), whereas I found only one rather late Minoan design of this sort, and no Mycenaean ones at all. Conversely, the Aegean artists liked patterns with only rotational symmetry (**p112**), such as their beloved running spiral, whereas the Egyptians avoided these altogether (except for an occasional row of Z's in the Neolithic). Patterns with only translation (**p111**) and patterns with glide reflection and a vertical reflection at the same time (**pma2**) were also particular favorites of the Minoans and Mycenaeans. The Egyptians flirted with them briefly in the Neolithic, and then dropped them for 1500 years, until they re-appear suddenly in the 18th Dynasty... Where? On the kilts of Aegean ambassadors to the Egyptian courts! With them come a little flock of **p1m1** patterns, which I found nowhere else in either the Egyptian or Minoan repertoires, but only in **Mycenaean** art, among the pottery and on the frescoes of textile designs! What this suggests is something that I and

others had suspected from the cut of the clothing shown on the Aegean ambassadors, but had not been able to prove otherwise: namely, that the kilted emissaries were specifically Mycenaeans as opposed to Minoans. Thank you, Dorothy and the TSA, for this piece of the puzzle![5]

NOTES

[1]Ludwig Borchardt, "Die Entstehung der Teppichbemahlung an altaegyptischen Decken und Gewoelben," **Zeitschrift fuer Bauwesen** 79.5 (1929), 111-15.

[2]George Bass, "Oldest Known Shipwreck Reveals Bronze Age Splendors," **National Geographic** 172 (Dec. 1987), 693-733.

[3]J.K. Brock, **Fortetsa: Early Greek Tombs near Knossos** (Cambridge, 1957). Color plates.

[4]Dorothy K. Washburn and Donald W. Crowe, **Symmetries of Culture: Theory and Practice of Plane Pattern Analysis"** (Seattle and London, 1988).

[5]All materials not otherwise footnoted here can be found in E.J.W. Barber, **Prehistoric Textiles: The Development of Cloth in the Neolithic and Bronze Ages, with Special Reference to the Aegean** (Princeton, December 1990).