THREADS OF THE PAST:

Historical, Cultural, and Technical Insights into the Creation of the *Mishkan*

By

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Submitted in partial fulfillment of the requirements for the degree of Master of Arts in Jewish Studies

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2025

Rockville, MD

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ACKNOWLEDGEMENTS

There are many people who have helped me and contributed to this project in a myriad of ways. I began my Academy of Jewish Religion experience with Dr. Job Jindo's Exodus course. He taught me to look critically at the text and see the depths below the *p'shat* reading. I remember telling him that I would love to figure out how to put together these Ikea-style instructions for the *Mishkan*. Whether he knew it or not, his laugh and encouragement started me down this path. I am so appreciative for every class I have had with Dr. Jindo and his insight into the Torah has forever changed how I interact with text.

Soon after, I began researching and soon created a seminar session called *Textiles in the Torah*. Since its inception, I have had the honor of presenting it several times, but it was its first presentation at a Women Cantors' Network conference where Cantor Anita Hochman and Rabbi Gail Nalven suggested to me that this should be my MA thesis topic. I am forever beholden to them for seeing not only my love of the subject but also its possibilities and uniqueness.

I am extremely thankful for my wonderful AJR advisor Rabbi Matthew Goldstone who searched high and low to find me the perfect thesis advisor, Dr. Leslie G. Virnelson. Dr. Virnelson is a wealth of knowledge, expertise, and help who introduced me to new pathways and research that I would never have thought of. If anyone says that this thesis is a scholarly work, it is entirely due to Dr. Virnelson's guiding hand and encouragement. Rabbi Goldstone, thank you for your kindness and gently prodding

which never felt overwhelming or pushy. I am forever indebted to both of you for keeping me focused and moving forward.

I would also like to thank Karthika Audinet of the Costen Textile Study Center of the Textile Museum of the George Washington University Museum, who graciously and patiently brought me sample after sample of Egyptian textiles. The time I spent studying at the Textile Museum was invaluable to my understanding of these ancient textiles. The whole experience was a dream come true; to look so closely at textiles that are thousands of years old was one of the most meaningful moments of my life. I am truly grateful for your help.

I would also like to thank my village of friends and family who supported me when I felt overwhelmed and bolstered me to greater and greater heights. Thanks to my amazing mother, Ginger Howard, who was always there to inspire me and remind me that I always get things done, even when I am too tired to go on. Thank you also to my wonderful in-laws, Judy and Marshall Meyer, who excitedly asked me questions about my project at every moment, read the first draft of my thesis, and championed every chapter and page. Thank you to my children, Ella and Owen Meyer who fixed themselves dinner, sometimes helped around the house, and were there to listen to my ideas, always give a hug, and to pull me down for a TV break. And a special thank you to Dr. Jessica Hoffman who in a moment of panic found copies of the documents I needed and emailed them to me. You were my hero!

I want to especially thank a few of my very large AJR *mishpacha*, Magda Reyes, Leah Cassorla, Rebecca Van Wagner, Talia Werber, and Jon Mitzmacher, whose daily

(one might even say hourly) support and friendship kept me going even when I thought I might never finish.

Finally, I must thank my absolutely wonderful husband and editor, Gabe Meyer, who read every word, page, and chapter so many times that we both have lost count. At this point, you probably could recite this whole thing from memory. During the last five years, you have taken over all the housework, kid and cat duties, and grocery shopping. Without you I wouldn't be able to accomplish half of the things that I want to do in this world. Gabe, thank you so much for your patience, your hugs when I'm feeling down, your support, your willing ear, and your unending understanding and love. None of this would have happened without you.

Chapter 1
INTRODUCTION

Over the last several years, I have had the honor of tutoring many B' Mitzvah students. This task not only includes assisting them in attaining fluency in reciting the Hebrew prayers, but also in understanding and chanting their *parsha* or Torah portion. Several students I have worked with were horrified to find that their assigned *parsha* was *Parashat Teruma,* Exodus 25:1 – 27:19 or *Parashat Va-yakhel,* Exodus 35:1-38:20. Many have struggled to find meaning and relevancy with what, in essence, is a long list of supplies and techniques for the creation of the *Mishkan,*[1] or the Tabernacle, in the desert. Having to write a *d'var Torah*, or speech, on a shopping list can be difficult. In most cases, the students have had little knowledge of the trades and crafts stipulated in the text, let alone the supplies used in those trades. Many find the experience confusing and difficult.

As I began to delve into the depths of the text, I found myself more and more intrigued with the "white space" in between the Hebrew text. As a weaver and spinner, my focus was on the textiles and looms used in the creation of the *Mishkan* and the surrounding enclosure. After taking a course on the Book of Exodus, with biblical scholar Dr. Job Jindo, I started to calculate the actual sizes of the various pieces of cloth that the Torah prescribes. As I began to think about the resources needed for such a task, I wondered: How did the Israelites source or create the supplies needed to make

[1] I will be using the Hebrew word *Mishkan* (מִשְׁכָּן), throughout this thesis when discussing the portable Tabernacle or Sanctuary created by the Israelites in the desert. By engaging with the Hebrew texts we are able to put aside our preconceived ideas of what a tabernacle or sanctuary is, which opens us up to creating a new image in our minds of what this structure may have looked like.

such large sections of cloth? What techniques were used? What kinds of looms were in use at that time, and did they need to be moveable as the people journeyed through the desert? Who did the work? Is there anything comparable in today's world? Then the most important question arose: How can I use the answers to these questions to stir my students' imaginations so that they gain a deeper understanding of the text?

This was the initial impetus for this project; however, I had been inching toward this project slowly over many years. We live in a world of fast cloth and clothing, where anything we might want is available in a moment, whether we order it from Amazon or buy it at Walmart or H&M; fabric and clothing are disposable commodities. At first, wanting to address this ecological issue, I began teaching a weaving course to elementary school children in both secular and religious school settings. My students loved the experience of creating something of beauty from random pieces of yarn. They would let their imaginations run wild, combining textures and techniques. It was a joy to see them discover the ancient craft of weaving and its sister crafts of spinning, felting, dying, and sewing.

FIGURE 1.1 – The author teaches a weaving class at Camp Ramah New England in Palmer, MA. (Left) The author's son with members of his weaving chug at Temple Shalom in Chevy Chase, MD. (Right) (Both photographs are from the Author's collection.)

But once upon the not-too-distant past, the creation of clothing and cloth itself was not an esoteric craft or an art form of the past, but a necessary skill. Sewing machines were in every home and many students (mostly women) learned the skills they needed to create and repair their clothing in a home economics course in middle or high school. Our mothers and grandmothers understood what it took to create a dress from a length of fabric, but many of the students I work with today do not. These skills are foreign to many and as objects and clothing began to appear from the work of their hands, they began to make connections. In each of my religious school weaving classes, at least one or two students would ask about weaving or the creation of clothing in biblical times. Occasionally, a student specifically asked about Joseph's coat, the priestly garments, and perhaps, the fabrics of the *Mishkan*. I began to teach not only weaving but the history of weaving and textiles in general. When their religious school classes would later read chapters from Exodus, many of their classmates would not see the love and care that our ancestors put into the creation of the panels of the *Mishkan*, but my weaving students learned that this work was not only the labor of their hands, but the labor of their hearts.

FIGURE 1.2 – Students at Temple Shalom in Chevy Chase, MD warping a vertical loom. (Photo from the Author's collection.)

As their questions grew, I found myself engaging more with the text and wanting answers. I knew of Bezalel, who is described in the Torah as a master craftsman, one who knew the many different types of crafts needed to create such a structure. However, Bezalel could not create such a massive structure on his own or train everyone. He needed people who were already trained in the various crafts to make the *Mishkan.* I soon began reading Elizabeth Barber's pivotal work *Women's Work - the first 20,000 years: Women, Cloth, and Early Times.* It was here, within these pages, where I first saw the diorama of an Egyptian weaving workshop from the Tomb of Meketre. As I read the text and looked closely at the workshop, I saw that the workers were women.

In Exodus 35:25-26, we are told that women spun the yarn for the *Mishkan*, but after seeing the diorama, I began to wonder who the women weavers were. I began looking at images and reading texts that showed that women, much like in our recent past, were also the weavers and spinners in the ancient world. I wanted to highlight the work of these forgotten and unnamed women. I wanted to show modern women and girls that the work of women was essential to the creation of the *Mishkan.* And I wanted to show that perhaps most of the workers in the creation of the textiles were women. The Israelite women didn't just spin, cook, and take care of the children; they used their talents to express their faith in and honor to God. During a life of servitude in Egypt, they learned the skills necessary to create an earthly dwelling place for YHVH.[2] The skills that would help their people go from a ragtag band of slaves to a nation of free

[2] YHVH is the transliteration of the unvocalized name of God. This is the name of God that was used in this section of Exodus, so I have chosen to use this instead of *Adonai* or *HaShem*, which are frequently used when chanting Torah or in discussion, to further demonstrate that those who wrote these sections were thinking of YHVH as opposed to one of the other names of God, such as El, Shadai, Shekhinah, or Elohim.

people who would make their way through the desert, become Ancient Israel, and proclaim YHVH as their God and sovereign.

The Exodus is a part of our cultural imagination. Yet, it is hard for some of us to break away from the image of Charleton Heston standing next to the matte painting of the Red Sea, but there is so much more to the Book of Exodus. Not once, but twice, we have a description of the creation of the *Mishkan*. The first can be seen as the instruction manual while the second is the description of the creation itself, like a high-speed YouTube video of the people working, however in this case, the Israelites did not raise the *Mishkan* in a five-minute montage. Rather, it took days and weeks of hard and, at times, very precise work to create the *Mishkan*. Perhaps by reading this thesis, the reader can slow down the video playing in the mind's eye and truly imagine the women, men, and children of all ages working toward a common goal. A goal of faith and hope, thereby offering the reader a much deeper view of the importance of the *Mishkan* not only to the Israelites' religious practice, but to our cultural heritage and imagination.

Chapter 2

ASSUMPTIONS

As Moshe Rosman says in his book *How Jewish is Jewish History?*, “Anyone who sets out to write about Jewish history – no matter what period or place – confronts basic questions about the enterprise before actually undertaking the task.”[3] This is very true of this thesis. We must delineate the who, what, and when of the story to then ascertain the tools, techniques, and supplies that might have been used. Luckily, the rate of evolution of the tools and techniques of creating cloth is very slow and so, a few hundred years on either side will not make a substantial difference. More importantly, we must deal with the realization that the events described in Exodus are more historical myth, than historical fact. As Nahum M. Sarna states in his commentary on the book of Exodus, “[The Book of Exodus is] a document of faith, not a dispassionate secular report... [which falls] into the category of historiosophy rather than historiography.”[4] To that end, we will attempt to balance our assumptions between historical fact, myth, cultural memory, and faith.

In 2014, a conference entitled “Out of Egypt: Israel's Exodus Between Text and Memory, History and Imagination” was held at the University of California, San Diego, that brought biblical scholars and archaeologists from around the world to discuss and share ideas relating to the Exodus. Throughout the two-day conference, many ideas and facts were presented by the more than 45 scholars. They reached a consensus that

[3] Murray Jay Rosman, *How Jewish Is Jewish History?* (Oxford: The Littman Library of Jewish Civilization, 2020), 19.
[4] Nahum M. Sarna, *The JPS Torah Commentary: Exodus/ שמות*(Philadelphia, PA: The Jewish Publication Society, 2001), xiii.

evidence indicates that a small group of people traveled freely between Egypt and Canaan and that those people were Levites.[5] At some point, perhaps a larger group of people did leave Egypt, but nowhere near the numbers described in the Torah (the Torah gives the figure of 630,000 men and their families, for a total of 2 million people.)[6] Through assimilation and generational memory, the story of the Levites' exodus[7] from Egypt filtered its way into the collective Canaanite memory, adapting and transmuting into our Passover story which we continue to remember and relive each year. Therefore, our main assumption will be that a group of people left Egypt sometime in the late Bronze or early Iron Age. These people would have spent a significant amount of time in Egypt, working in Egyptian workrooms and mastering Egyptian techniques and as we will show, the writers of the Torah based their understanding, structure, and description of the *Mishkan* on Egyptian sources and iconography.

Placing the Exodus in the late Bronze or early Iron Age allows us to make assumptions about which supplies the Ancient Israelites would have used and hypothesize about where they might have acquired them, but this may be a place where myth and faith fill in the gaps of historical record. Although lesser-quality dyestuffs and fibers would have been readily available, cultural practice throughout the ages is to use only the highest quality supplies to create textiles for a sovereign and our faith teaches us that YHVH is the sovereign of the Israelites and the Jewish people. Therefore, we will assume that only the finest materials would be used to create the *Mishkan*.

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[5] Richard Elliott Friedman, "The Exodus Is Not Fiction," *Reform Judaism*, Spring 2014.
[6] Ibid.
[7] Friedman explains that some of the evidence that this group may have been Levites can be found in the Song of Deborah, written in the 12th or 11th century BCE. This work does not list the Levites in the group of 10 tribes summoned, thereby pointing to their absence from the land of Israel at the time.

One of the questions asked by the Sages, and one that we will consider as we begin to explore the physical possibilities of the creation process, is exactly how long it took the Israelites to complete the *Mishkan*? We know, based on the large cultural projects throughout time, such as the initial building and reconstruction of Notre Dame, the building of the Pyramids, or the Great Wall of China, that given an infinite amount of time, supplies, and a willing workforce, miraculous things can be accomplished. Yet through the lens of *midrash*, the Sages have applied a framework of 70-90 days for the completion of the *Mishkan*. *Midrashim* seeks to fill in the "white space" of the Torah and although these calculations were made hundreds, if not thousands of years after the events described they do give us a timeframe in which to base our calculations. The Israelites could have easily created the *Mishkan* given a year or two, but the Sages have applied an unusually shortened timeframe to the story. They tell us that when Moses descended from Mount Sinai with the second set of scrolls he brought with him the instructions for the creation of the *Mishkan*. Based on the date, the 1st of Nissan, given in the Torah for the dedication of the *Mishkan,* this would only allow for 70-90 days. And we must remember that these days would include Shabbat, on which no work could be done.[8]

Additionally, given the preciousness of the supplies and the fact that these people were newly freed from generations of slavery, the whole endeavor seems like a nearly impossible task. Where did these supplies come from? The process of creating new yarns from scratch would require almost a year to complete, from growing or harvesting, to shearing, cleaning, carding, dying, and finally spinning. Moreover,

[8] Midrash Tachuma, Pekudei 11

weaving large pieces of cloth on simple looms would require a vast number of work hours. If we assume a much smaller workforce, how could such a grand undertaking be completed in just a few months? Reconciliation can be found by applying theology and faith to the problem. Perhaps, just as YHVH provided manna for sustenance, YHVH also provided the supplies, the ability, and the time needed to complete the *Mishkan*. We are told in Exodus 12:35-46 that when the Israelites left Egypt, they “borrowed” jewels, gold, and other things they would need on the journey. Could this be a miracle similar to that of the oil on Hanukkah? Could the Israelites have brought just a bit of dyestuff, enough for only a few skeins of yarn that then lasted throughout the whole project? Could the same be said for the wool and the flax? Could the days have been just a bit longer or the speed at which they wove a little faster?

For many, imagining such things is impossible because those in the modern world have no concept of how these crafts were done. This may be the moment where history, theology, and faith intersect to aid in our understanding of the requirements for the building of the *Mishkan.* Based on Torah, we know that through faith, reverence, community, and love the Israelites were able to create a symbol, not only of YHVH’s majesty but of their commitment to their God and their newly won freedom. Maybe with a better understanding of the tools and techniques, we can more deeply understand and embody their strength of faith and commitment.

Chapter 3

TENT DESIGN AND INSPIRATION

In the 19th century, Julius Wellhausen (1844-1918) revolutionized biblical study by creating a style and way of biblical scholarship based on documentary hypothesis rather than blind faith. He put forth the idea that the Bible was a creation of man, not Moses, and that it was based on years of oral tradition passed down and later transcribed and modified. This thinking would continue to expand throughout the 20th and 21st centuries, influencing generations of modern biblical scholars.[9]

Regarding the *Mishkan* in the desert, Wellhausen believed that it was a creation of the post-exilic Priestly writers, who, in essence, created a moveable fabric version of King Solomon's Temple in Jerusalem. He believed the Priestly writers "could not imagine a time in which the people of Israel were without a sanctuary."[10] So, they created one based on the pattern that they were most familiar with. This was the leading theory for more than three-quarters of a century. In the 1970s, Bernhard Pelze supported and modified this idea, explaining that it was not an imaginary copy of the Temple in Jerusalem, but an actual moveable structure created for the people and utilized during the Babylonian Exile. Many biblical scholars debunked this idea, for if such a structure had been created, it would certainly have found its way into other

[9] "Julius Wellhausen." Encyclopædia Britannica. Accessed October 5, 2024. https://www.britannica.com/biography/Julius-Wellhausen.
[10] James Karl Hoffmeier, *Ancient Israel In Sinai: The Evidence for the Authenticity of the Wilderness Tradition* (New York: Oxford University Press, 2011), 194.

concurrent biblical texts, such as the book of Ezra or Ezkiel. Yet, no corroborating textual evidence has been found to support this idea.[11]

This line of research led many to question the historicity of the Exodus itself and also that of the *Mishkan*. This affected the studies in comparative tent cultures, as many scholars believed there was no longer a need to find the cultural inspiration for the style and layout of the *Mishkan*.[12] Most research stopped until 1947, when Frank M. Cross Jr. published an article in *The Biblical Archaeologist Reader* comparing various tent shrines from the surrounding civilizations to that of the biblical description of the *Mishkan,* with the hopes of finding the historical inspiration and reintroducing its historicity into Biblical scholarship.[13] Later scholars, such as Michael Horman in his book *To Your Tents, O Israel! The Terminology, Function, Form, and Symbolism of Tents in the Hebrew Bible and the Ancient Near East,* delved further into this study using iconography and textual sources to strengthen the argument that not only could the *Mishkan* have been built, but that its form and style was deeply connected to tents from surrounding cultures and civilizations.[14]

The Bedouin Tent Shrines

When people think of movable structures in the desert, many immediately think of Bedouin tents. Their two millennial-long tradition of nomadic tent building is still visible today in modern-day Israel and the surrounding countries. Consequently, it was natural for most researchers to begin with the Bedouins, a culture which has Arabic

[11] Hoffmeier, *Ancient Israel In Sinai*, 194.
[12] Ibid, 203.
[13] Ibid, 204.
[14] Michael M. Homan, *To Your Tents, O Israel!: The Terminology, Function, Form, and Symbolism of Tents in the Hebrew Bible and the Ancient near East* (Leiden: Brill, 2002), 89-128.

Semitic roots. This research, which began as early as 1883, focused on the sacred tent styles of the ‘*utfah*, the *mahmal*, and the *qubbah,* as apposed to the familial tent structures.[15] The first of these sacred tents, the ‘*utfah*, which Cross noted was still in use as late as 1947, is a wooden structure, often covered with ostrich feathers that “more or less resembles a tent.”[16] (Figure 3.1) It is designed to sit atop a camel and when “it begins to move, the entire tribe follows suit, and where it kneels is where the camp is pitched”[17] which is reminiscent of how YHVH leads the way in the form of a pillar of smoke and wherever the smoke rests, so do the people. Cross also notes that sacrifices were still made near such tents and similarly to the holy rites of the *Mishkan*, blood would be sprinkled upon them. Biblical scholar Jeffrey H. Tigay also comments on the similarities between the descriptions of the ‘*utfah* and the use of the Ark as described in the book of Samuel.

Fig. 1. — *'Utfa*, front view.

FIGURE 3.1 – An ‘*utfa* from the front. Plate 1 - From *Sudan Notes and Records*, Vol. 1, No. 4 (1918).

[15] Homan, *To Your Tents, O Israel!*, 90.
[16] Frank M. Cross, “The Tabernacle: A Study from an Archaeological and Historical Approach,” *The Biblical Archaeologist* 10, no. 3 (September 1947): 45–68, https://doi.org/10.2307/3209346, 60.
[17] Jeffrey H. Tigay, “Parashat Terumah,” essay, in *Learn Torah With...*, ed. S. Kelman and J.L. Grishaver (Los Angeles, CA: Alef Design Group, 1996), 141–47, 141.

Another Bedouin tent shrine is the *mahmal* (Figure 3.2), which like the *Mishkan,* is a heavily ornate “boxlike framework with a domed top.” It too was meant to be carried by a camel and was, until recently, frequently used during pilgrimages to Mecca.

Fig. 2. — The *Mahmal* leaving the Citadel, Cairo.

FIGURE 3.2 – A m*ahmal* leaving the Citadel, Cairo. Plate II - From *Sudan Notes and Records*, Vol. 1, No. 4 (1918).

The last Bedouin text example is the *qubbah,* which is of a similar shape to the *mahmal* and may be an early ancestor. The most interesting feature of the *qubbah* may have been its red leather covering, which may have been the predecessor of the red leather covering of the *Mishkan*.[18] Although these three tents differ in size and form from the *Mishkan,* they do “provide extra-biblical evidence of Semitic tent shrines serving in processions and battle”[19] and their importance to the religious life of the culture.

[18] Homan, *To Your Tents, O Israel!*, 92-94.
[19] Ibid. 91-92.

Phoenician Tent Shrines

The great Greek Jewish philosopher and historian Philo (15–10 BCE to 45–50 CE) referred to another culture that used tents to house their gods, the Phoenicians.[20] The Phoenicians were a Semitic maritime culture on the coasts of the Levant, whose civilization reached its height from 1500-64 BCE. In addition to their maritime prowess and beautifully adorned ships, they were known for their textile production, especially their use of murex dyes (See Chapter 5) to create the color Tyrian purple, from which their name may be derived.[21] As Michael Homan remarks in his book *To Your Tents, O Israel!*, although little remains of their civilization, there is a cache of coins found in Sidon upon which there are depictions of various tent shrines, one of which is moveable.(Figure 3.3) This shrine is constructed on a two-wheeled cart with palm branches protruding from its roof.[22]

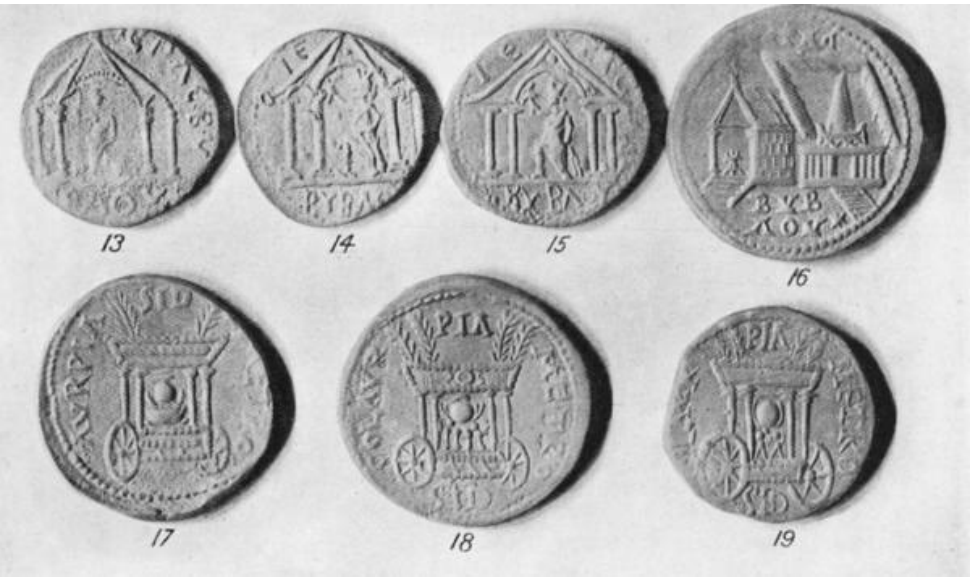

FIGURE 3.3- Coins found in Sidon that display various Phoenician tent shrines. Plate III – From G.F. Hill's article "Some Graeco-Phoenician Shrines," in *The Journal of Hellenic Studies* (1911).

[20] Homan, *To Your Tents, O Israel!*, 101.
[21] Sara Toth Stub, "Letter from Israel - the Price of Purple - Archaeology Magazine - November/December 2020," Archaeology Magazine , June 15, 2024, https://archaeology.org/issues/november-december-2020/letters-from/israel-purple-dye/.
[22] Homan, *To Your Tents, O Israel!*, 102.

Homan continues his exploration by stating that many historians believe that like the *Mishkan*, this cart was pulled by oxen and may have been the early home of the Canaanite god El. Other ancient historians, such as Diodorus, confirm the use of a Phoenician tent shrine, that includes a nearby altar, in various military campaigns. Later sources suggest that these carts may have also housed moveable Torah arks. Although most scholars are uncertain as to the name of the god that was worshiped in these moveable shrines, one can see the correlation between these shrines and the Holy of Holies found at the center of the *Mishkan*.[23]

Egyptian Funeral and War Tents

In his discussion of Egyptian tents, Homan states that the firmest connection between the *Mishkan* and other tent shrines can be found in the archaeological evidence of Egypt. Unlike the previous described tents, these Egyptian tents, those used for funerals and others used as portable housing for the King during times of war, show the greatest number of parallels to that of the *Mishkan.* For example, the ceilings or roof panels of the Egyptian purification tents, used in the practice of mummification, were often embroidered or painted to resemble the sky.[24] The embroidery of heavenly bodies may be related to the embroidered or woven cherubs on the innermost layer of the *Mishkan*. Several of these funeral tents, also called palls, have been found in various archeological excavations, however as they are often seen as secondary finds, they are frequently overlooked and therefore, the condition of the fabric is usually extremely poor.[25] Homan notes that this is the case of the pall found in the tomb of

[23] Homan, *To Your Tents, O Israel!*, 99-104.
[24] Ibid, 105-106.
[25] Ibid, 106-10.

Queen Isetemkheb which was a large tent (22' x 19') of appliqued colored gazelle leather with edges bound in pink leather cord and sewn with pink thread.[26](Figure 3.4) This corresponds to the inner canopy of the *Mishkan,* as this tent is adorned with winged figures (Figure 3.5) and is believed to have been created at approximately the same time as King Solomon was building the Temple in Jerusalem.[27] Scholars believe that at one time the tomb would also have included a wooden frame. However, looters either removed the wood or it had disintegrated by the time the archaeologists entered the tomb, causing it to be found in a heap on the tomb floor.[28]

FIGURE 3.4-Photo of the side of Isetemkheb's funeral pall on display in the Egyptian Museum Cairo. Photo by Merja Attia. Used with the permission of the photographer. (2022).

[26] Villiers Stuart, *The Funeral Tent of an Egyptian Queen: Printed in Colours, in Facsimile, From the Author's Drawing Taken at Boulak* (London: John Murray, 1882), 5.
[27] Ibid, 9.
[28] Homan, *To Your Tents, O Israel!*, 107.

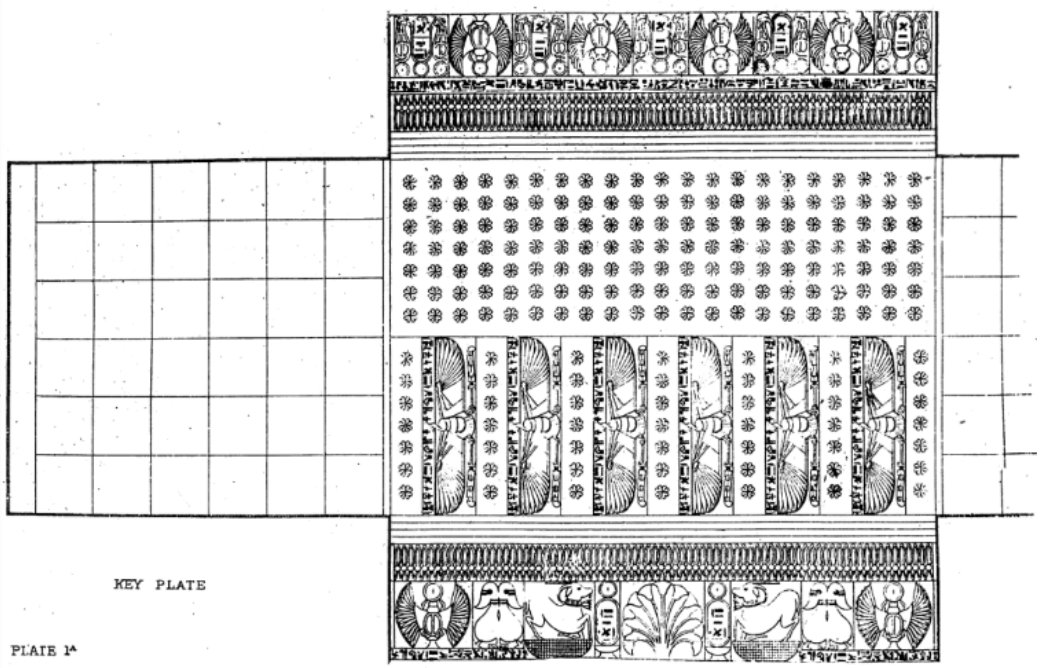

FIGURE 3.5- Plate 1a a drawing of Queen Isetemkheb's tent by Villiers Stuart from his book *The Funeral Tent of an Egyptian Queen* (1882).

Homan also draws comparisons to the funerary pall discovered in Tutankhamun's tomb. Although noted as an important textile artifact and initially rolled with great care by Howard Carter and his associates, the fabric was then tossed aside during Carter's battle with the Egyptian government over access to the site. When they returned to the site, the fabric had disintegrated greatly, with only a few large pieces remaining intact.[29] Homan explains that like the *Mishkan,* it consisted of several coarsely woven linen panels sewn together. A possible reason for the coarseness of the weave was so the fabric could support the heavy golden rosettes that were sewn in regular intervals onto the linen. (Figure 3.7) Unlike Queen Isetemkheb's tomb, the wooden support frame, which measured approximately 14'x10' was still intact, with the pall resting upon it.[30]

[29] Homan, *To Your Tents, O Israel!*, 107.
[30] Ibid.

FIGURE 3.6- Remains of the Tutankhamun's funeral pall on display in Egyptian Museum Cario. Photo by Merja Attia. Used with permission of the photographer. (2019).

The disintegration of the two above examples of period tents shows the inherent difficulty in studying fabrics of the period and consequently one must rely on textual and iconography sources.[31] There are many New Kingdom texts which illustrate the Egyptian's use of tents shrines to house their kings, often revered as gods.[32] Homan describes in his book, the striking resemblance of the *Mishkan* to the Egyptian tent shrine of King Rameses II's military camp at Kadesh. (Figure 3.7) He explains that the *Mishkan* mimics this layout exactly with the Holy Tent in place of Rameses' reception tent and the Holy of Holies in place of the Pharoah's central private chamber. (Figure 3.8) Both camps are oriented in the same direction and as can be seen in the relief from Kadesh, Pharoah's throne is "flanked by falcon wings, just as the ark is flanked by winged cherubim." [33]

[31] Homan, *To Your Tents, O Israel!*, 107.
[32] Ibid, 111.
[33] Homan, *To Your Tents, O Israel!*, 113.

FIGURE 3.7 – Rameses II war tent with winged figures around the cartouche for Rameses II. Photo by Olaf Tausch. Creative Commons.

Of all the possible tent sources, one cannot deny the striking similarity and draw the conclusion that the writers of Exodus were trying to make a connection between the warrior King Rameses II and their warrior God, YHVH. There are many instances in both Exodus and Deuteronomy where YHVH fights and commands the Israelites from within YHVH's war tent. These similarities suggest that the Priestly writers were not creating a representation of King Solomon's Temple in fabric as Wellhausen suggested but instead were relying upon historical iconography or knowledge of the Egyptian military encampment.[34] This lends credence to the assumption that if the *Mishkan's* shape and construction is inspired by the tents of Egypt, then similar techniques and materials would have been employed to create both.

[34] Homan, *To Your Tents, O Israel!*, 111 – 116.

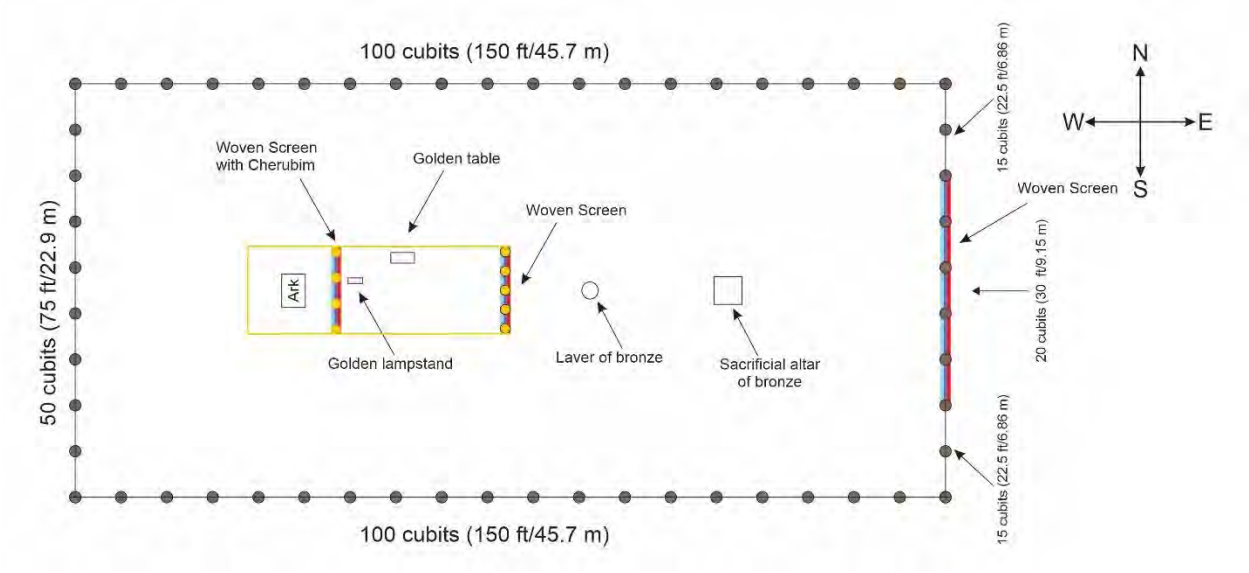

FIGURE 3.8 – Author's drawing of the layout of the *Mishkan* and its enclosure.

FIGURE 3.9 – Illustration from the *Codex Amiatinus*, a Vulagte manuscript found in the Biblioteca Medicea Laurenziana in Florence. 8th Century, fol. 2v and 3r. Creative Commons.

Chapter 4
FIBERS AND TOOLS

Introduction

In the April 2020 edition of the magazine New Scientist, an article appeared announcing the recent discovery of a piece of string in a cave in France which researchers believed to be 50,000 years old. Much like the work of spinners today, the fibers were twisted together in an S-twist and then plied together into a 3-strand Z-twist cord. Before this discovery, the oldest surviving piece of string was found near the Sea of Galilee in Israel, at a site called Ohalo II.[35] In contrast, the oldest extant woven textile was discovered at the Çatalhöyük archeological site in Anatolia, Turkey, and dates from the 7th millennium BCE.[36] These textile fragments, in addition to imprints of textiles from other archeological sites, show that humans were spinning both plant and animal fibers and weaving them together into cloth using a basic tabby-weave structure long before Exodus' late Bronze Age target date.[37] Therefore by the time of the Exodus, many cultures had a rich tradition of spinning, dying, and weaving that could have been used to create the *Mishkan*.

[35] Michael LePage, "Oldest Ever Piece of String Was Made by Neanderthals 50,000 Years Ago," New Scientist, April 15, 2020, https://www.newscientist.com/article/2240117-oldest-ever-piece-of-string-was-made-by-neanderthals-50000-years-ago/.
[36] Lise Bender Jørgensen, Antoinette Rast-Eicher, and Willeke Wendrich, "Earliest Evidence for Textile Technologies," *Paléorient*, no. 49–1 (June 22, 2023): 213–28, https://doi.org/10.4000/paleorient.2479.
[37] Ibid.

Exodus 25:1-5

א וַיְדַבֵּר יְהוָה אֶל־מֹשֶׁה לֵאמֹר: ב דַּבֵּר אֶל־בְּנֵי יִשְׂרָאֵל וְיִקְחוּ־לִי תְּרוּמָה מֵאֵת כָּל־
אִישׁ אֲשֶׁר יִדְּבֶנּוּ לִבּוֹ תִּקְחוּ אֶת־תְּרוּמָתִי: ג וְזֹאת הַתְּרוּמָה אֲשֶׁר תִּקְחוּ מֵאִתָּם זָהָב
וָכֶסֶף וּנְחֹשֶׁת: ד וּתְכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ וְעִזִּים: ה וְעֹרֹת אֵילִם מְאָדָּמִים
וְעֹרֹת תְּחָשִׁים וַעֲצֵי שִׁטִּים:

[1] And YHVH spoke to Moses saying: [2]Speak to the Children of Israel and they will bring to me an offering, from every person who willingly gives from his heart you will take my offering. [3]And this is the offering that you shall take from them: gold, silver, and copper, [4]Blue, purple, and scarlet yarns, linen, and goat's hair, [5]And ram skins dyed red, dolphin/badger skins, and acacia wood.[38]

Parashat Terumah (Exodus 25:1- 27:19) begins with a list of items that the Israelites need to bring for the building of the *Mishkan* which include a list of yarns: blue, purple, scarlet, linen, and goats' hair. These items were to be brought to Moses with a willing heart, but one wonders where former slaves acquired such valuable possessions? The answer can be found in Exodus 12:35-46, where it states that the people "borrowed" gold and silver from their Egyptian neighbors and masters. The logical assumption is that in addition to these precious metals, they also "borrowed" the building blocks of fabric: fibers, yarns, and tools. Nevertheless, the question remains, with such a great undertaking would they have been able to bring enough materials with them to complete it? This chapter will explore the various fibers, techniques, and equipment that may have been used with the hopes of better understanding the process used by the Israelites to create such an undertaking.

[38] All translations are the Author's and can be found at end of the document.

Flax

All textiles begin as fibers, either plant or animal-based. From the bast[39] in reeds and grasses to the hair of camels and yaks, yarn can be created from a variety of sources. In the case of the yarns for the weaving of the fabric for the *Mishkan*, Exodus 25:4 uses two words to stipulate the specific fibers to be used: שֵׁשׁ וְעִזִּים (*sheish v'izeim*) often translated as linen and goats' hair. The Hebrew word for linen, *sheish,* is believed to be borrowed from the Egyptian word, *sheush*, and not the later Hebrew word for the number six. In Egyptian texts, *sheush/sheish* is specifically used to describe very white and fine linen.[40]

Flax (*Linum usitatissimum*) is the plant whose bast fiber is used to create linen. Initially, flax grew wild and has been proven to be one of the earliest known fibers used by man. Most historians believe that the domestication of flax began around 5000 BCE. Originally from the Levant[41], the flax plant found its way to Egypt where it became one of the most valuable commodities in the ancient world.[42] The finer the flax, the greater its value. There were four grades of flax/linen cloth designated in descending order of value as "royal linen," "fine thin cloth," "thin cloth," and "smooth or ordinary cloth."[43] The finest of these textiles may have had as many as 500 threads per inch in contrast with many bedsheets today which are manufactured with between 300-1000 threads per

[39] Bast are the woody fibers found in plants and some trees.
[40] John McClintock and James Strong, eds., "Linen" McClintock and Strong Biblical Cyclopedia Online, accessed October 18, 2024, https://www.biblicalcyclopedia.com/L/linen.html.
[41] Ancient Levant was a region that encompassed modern day Israel, Lebanon, Jordan, and parts of Syria.
[42] E. J. W. Barber, *Prehistoric Textiles the Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean. Barber, E. J.W* (Princeton, NJ: Princeton University Press, 2021), 11-12.
[43] Rosalind M. Hall, *Egyptian Textiles* (Princes Risborough, Buckinghamshire: Shire, 2001), 9.

inch. Anything over 300 thread per inch was unheard of as little as twenty years ago because modern textile machines could not easily manufacture such fine textiles without breakage.

The quality of the cloth was dependent on when and how the flax was harvested. In hot climates such as Egypt, linen is a winter crop, sowed in November and harvested in as little as 110 days.[44] The procedure for planting, harvesting, and processing flax into thread or yarn has changed little in 10,000 years, which is evident from early tomb paintings and even the writings of by Pliny the Elder in the 1st Century CE.[45] The color of the flax designates the age and eventual grade of the cloth. For example, green flax would yield a fine thread and soft ethereal fabric, whereas more mature plants would yield stronger fibers to be used in hardwearing coarse cloth.[46]

In Figure 4.1 a man and woman can be seen pulling green flax. Pulling flax by the roots was and continues to be the preferred method of harvesting after which they are then set aside in bundles to dry or cure.[47]

FIGURE 4.1 – From the Tomb of Sennedjem in Thebes, showing the harvesting of green flax. Creative Commons.

[44] Forbes, *Studies in Ancient Technology*, vol. 4 (New York, NY : Brill, 1956), 4.
[45] Barber, *Prehistoric Textiles,* 12-13.
[46] Forbes, *Studies in Ancient Technology*, 29.
[47] Barber, *Prehistoric Textiles,* 12-13.

The next step in the process is retting or rotting. This can be done slowly on the roof of a home, allowing the evening's dew to slowly penetrate the fibers, or quickly by placing the bundles in rivers or ponds, which would yield a "supple and golden blond" product.[48] This was a very delicate process as under-retting would result in fibers that would be hard to separate and over-retting would cause the fibers to become too weak to use.[49]

After retting, the bundles of flax would again be laid out to dry. After drying, they would undergo a beating process, called "braking" (Figure 4.2) where a bat was used to break up the fibers. They would then be "hackled" or "heckled" a form of combing. (Figure 4.3). Through this process, the fibers would be released into their threadlike form and the short-broken fibers, which would impede spinning, would be removed. Any remaining seeds would be removed to be used for planting in the next season. The final step is splicing and spinning.[50]

FIGURE 4.2 – Drawing of a scene from the main chamber of the Beni Hasan Tomb depicting the retting and braking process for flax. From Tomb 2, main chamber-west wall. From Newberry and Fraser's book *Beni Hasan* vol. 1. Plate XI (1893).

[48] Barber, *Prehistoric Textiles,* 13.
[49] Ibid
[50] Ibid.

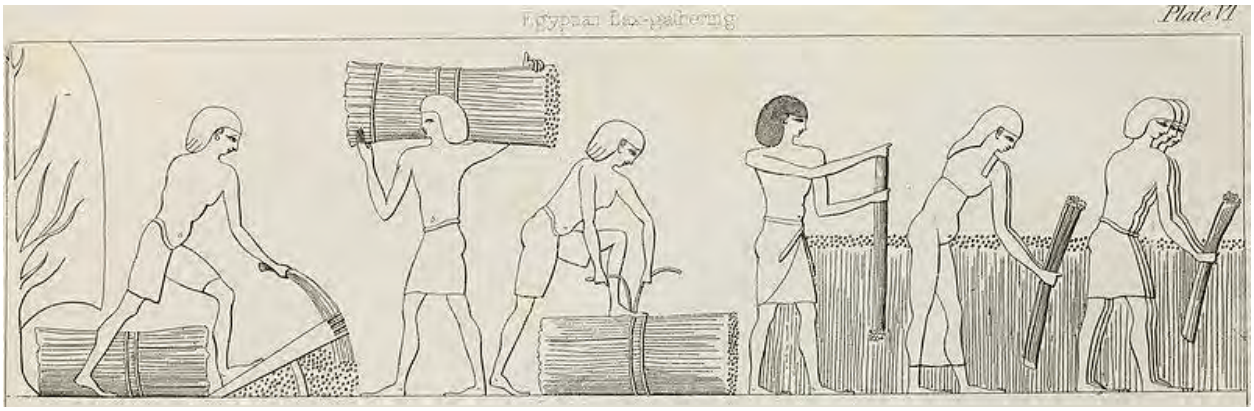

FIGURE 4.3 – Combing, bundling and harvesting of linen from *Textrinum Antiquorum: An Account of the Weaving Among the Ancients* by James Yates (1873). Creative Commons.

Wool

The other fiber used in the creation of the *Mishkan* is wool, specifically goats' hair. Wool, mostly sheep's wool, was known to the Ancient Egyptians and there is some archeological evidence that it was used for capes and other clothing. It was most commonly used as tent cloth since wool is not only hard-wearing but can be somewhat waterproof as well.[51] Sheep were domesticated as early as Neolithic times and there is much evidence for the use of their wool in what would become modern-day Afghanistan and Iran.[52] Around 2000 BCE, large flocks of domesticated sheep were notated in the administrative texts of Ur III. These flocks numbered in the tens of thousands and were shorn each year around the New Year.[53] As sheep shears, similar to large scissors, are an Iron Age invention, sheep and goats would be shorn by either shaving the wool with a large sharp knife or by plucking.[54] Plucking could only be done once a year when the sheep were molting, unlike shaving which may have been done twice a year. Pliny the

[51] R.J. Forbes, *Studies in Ancient Technology*, 5.
[52] Ibid, 2-3.
[53] Ibid, 7.
[54] Ibid, 8.

Elder maintains that even as late as 1st century CE, plucking was still a popular method of shearing even though it yields far less wool than shaving.[55]

Wool, like flax, was seen as a valuable commodity, and its production was centered in Mesopotamia, often called the "Land of Wool."[56] This area housed large manufacturing complexes of workshops filled with women and children who processed the wool and wove it into fabrics that were later traded throughout the Ancient Near East.[57] One may wonder why, with such a concentration on the breeding of sheep and the use of sheep's wool, would the makers of the *Mishkan* would use goats' hair? Additionally, based on my personal experience, spinning goats' wool it is extremely difficult, as the outer hairs are coarse and thick creating a rough, chunky yarn and the inner hairs are extremely short forcing the spinner to spin a very highly twisted fine yarn. Michael Ryder in his article "The Use of Goat Hair and Introductory Historical Review" explains that the outer coat of the ancient goat was not suitable for textiles as it was too coarse and was rarely used in textile production. Nevertheless, there seems to be a history of its use in tent fabrics, as seen in the nomadic cultures of the Middle East (i.e. Bedouin), North Africa and Tibet, which may be due to its black color which provides greater shade and cooling. One of the more interesting points Ryder makes is that the value of goats' hair in Bronze Age Babylonia "was one quarter of the value of sheep's wool." This brings us to our initial question, why would they choose to use the less

[55] Barber, *Prehistoric Textiles,* 21.
[56] Catherine Breniquet, "Early Wool of Mesopotamia, c. 7000–3000 BC. Between Prestige and Economy," *The Competition of Fibres*, April 30, 2020, 17–26, https://doi.org/10.2307/j.ctv13pk7d6.9, 17.
[57] Ibid.

valuable goats' hair wool that was more difficult to spin instead of the readily prevalent, easily spun sheep's wool?[58]

Perhaps, it is because goats, unlike sheep, seem to have a special place in the adjacent cultures of the Ancient Near East. As Merida Roets states in her paper "Goats in the Ancient Near East and Their Relationship with the Mythology, Fairytale and Folklore of These Cultures," many of the surrounding cultures (Sumerian, Anatolian, Assyrian and Elamite) have a long-standing tradition of using goats as sacrificial animals and surrounding their temples with not only herds of goats, but goat statues of all sizes. Goats are frequently pictured with various rulers and gods (Figure 4.4) and

FIGURE 4.4 – Gold statue of a man, who may be a king, holding a goat. From the Middle Elamite period c.1500-1200 BCE. Located in the Louvre, Paris. Accession number Sb 2758. Creative Commons.

[58] 1. Michael Ryder, "The Use of Goat Hair an Introductory Historical Review," *Anthropozoologica* No. 17 (1993): 37–46, 38-40.

were considered an important part of “divining the future” and communing with the gods.[59] In addition, they were known to have the ability to embody evil spirits or have sins transferred into them, for example the “scapegoat” described in Leviticus 16:21. So in addition to the cooling aspects of black goats’ hair, these mystical abilities may have been one of the reason that goats’ hair was used for the yarn of the *Mishkan* instead of the more common sheep’s wool.

Spindles, Whorls, and Spinning

To create yarn one must introduce a twist into the fibers. Many today associate the word “spin” with this twisting of the fibers, but it relates to the drawing out or the “span” of the fibers. Before one can spin the fibers it must undergo a process of combing that aligns the fibers in a parallel fashion so that they can be “drafted” or drawn out into a “sliver” or a long strip of fiber. From this point, a spinner may use several tools or techniques to introduce a twist which will further bind the fibers together.[60] The earliest type of spinning may have been “hand spinning,” where the spinner twists the fibers by rolling them between her hands or against her leg.[61] As the length of the thread grows, the spinner would need to store it, which may be how a long stick was introduced into the process. The spinning stick or hook was a long stick with a carved groove or hook at the end. The end of the sliver would be attached to the hook and the spinner would then twist the stick causing the fibers to twist. She would then wind the

[59] Merida Roets, “Goats in the Ancient Near East and Their Relationship with the Mythology, Fairytale and Folklore of These Cultures,” *Goats (Capra) - From Ancient to Modern*, July 15, 2020, https://doi.org/10.5772/intechopen.82531.
[60] Forbes, *Studies in Ancient Technology*, 152.
[61] Barber, *Prehistoric Textiles,* 41.

twisted fiber onto the stick.[62] Both of these techniques are still in use in many cultures around the world and are often the first steps a modern spinner (of any age) will learn before moving on to a drop spindle or a wheel.

During the Bronze Age, the most prevalent spinning implement was the drop-spindle, which is a circle of stone, ceramic, bone, or wood attached to a stick with a corresponding notch or a hook on the other end. This circle, called a whorl, may be any shape but the most prevalent shape found in archeological sites in Egypt is conical (Figure 4.5).[63] The quality of the thread is determined by the weight of the whorl,

FIGURE 4.5 – Egyptian New Kingdom spindles and whorls from the collection of the Metropolitan Museum. Accession numbers: (Top, Left to Right) 11.151.686, 22.1.756, 22.1.1136, 153.691 (Bottom, Left to Right) 15.3.1097, 11.151.682. Creative Commons Zero.

the finer the thread, the lighter the whorl. The spinner sets the whorl in motion either with her hand or by running the shaft down her leg (Figure 4.6). The whorl acts as a flywheel providing momentum to the twist; if too much twist is introduced, the fiber will curl and create tangles; if there is too little twist, the resulting thread will be weak and

[62] Barber, *Prehistoric Textiles,* 154.
[63] Gillian Vogelsang-Eastwood, “Textiles,” essay, in *Ancient Egyptian Materials and Technology* (Cambridge, UK: Cambridge University Press, 2009), 268–98, 272.

FIGURE 4.6 – Wooden model of weavers and a spinner beginning to put the drop spindle into motion. From the Deir el-Bersha, Tomb 10 in Egypt. Middle Kingdom (2010-1961 BCE.) Boston Museum of Fine Arts. Accession number 21.891. Public Domain.

breakages will occur.[64] The whorl can be placed either on the bottom or on the top of the shaft. Early European and most modern spinners tend to prefer low whorl drop spindles, as they are easier for beginners to control.[65] Egyptian iconography supports the use of high whorl spindles and in fact, the hieroglyphic for the word “spindle” includes an image of a high whorl spindle. (Figure 4.7)

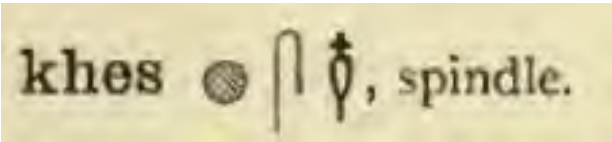

FIGURE 4.7 – Dictionary entry for the word “Spindle” from Sir E. A. Wallis Budge’s, *An Egyptian Hieroglyphic Dictionary* (1920)

[64] Kathryn Keith, “Spindle Whorls, Gender, and Ethnicity at Late Chalcolithic Hacinebi Tepe,” *Journal of Field Archaeology* 25, no. 4 (1998): 497–515, https://doi.org/10.2307/530641, 502-503..

[65] I own several drop spindles made in various styles and of different materials. My first drop spindle was a gift from the Spin-Off editor who was a friend of my father. It was a top whorl spindle made of an old CD and a dowl. From there I graduated to a bottom whorl spindle. My favorite spindle is a Turkish spindle which is a bottom whorl spindle. The yarn collects on the bottom of the spindle, adding weight as the newly spun yarn is wound on it. I find that I have more control and can spin finer yarn on bottom whorl spindles. However, in talking to many spinners, this seems to be an aspect of personal taste.

Although the basic mechanics of spinning are the same for any fiber, there are some differences. The wool of the period was considered a short-staple fiber, meaning that the individual strands of hair were quite short. The spinner had to constantly add more fiber to the growing length of thread.[66] To aid this a distaff was often used. A distaff is a large stick from one to three feet long, that may be placed on a bench or is held under the opposite underarm.[67] This stick holds the combed or fluffed fibers, allowing the spinner to have a constant supply of wool from which to pull during the drafting process of spinning. Once the thread has grown to an unmanageable length, it is wound on the spindle and the spinner again sets it in motion.

The twist that is created in the yarn is either in an S or Z direction. Flax, as it dries, naturally twists in an S direction, whereas wool may be spun in either direction.[68] Since flax naturally twists itself, there may not have been a need for an initial spinning to create thread. Spinners may have just spliced the long flax fibers together, sealed with saliva, since the enzymes in saliva cause the fibers to decompose slightly and stick together.[69] Spinners would then create long bundles of spliced fibers which would be twisted together or plied. When two or more strands are plied together, they twist in the opposite direction of the original fiber, thereby locking the strands together. The spinner would try to stagger the splice points and in doing so, create a strong, smooth yarn. Flax is an inherently brittle material and must be kept wet while spinning and weaving. There are many depictions of spinners spinning with the aid of spinning

[66] Barber, *Prehistoric Textiles*, 49.
[67] Forbes, *Studies in Ancient Technology,* 152.
[68] Ibid.
[69] Elizabeth Wayland Barber, *Women's Work - the First 20, 000 Years: Women, Cloth, and Society in Early Times* (New York: W.W. Norton, 1996), 191-192.

bowls (Figure 4.8). These bowls would be filled with water and had hooks or holes where the thread would be fed through, not only to keep it from tangling, but to provide a bit of tension which aids in plying.[70] (Figure 4.9) The skill of plying is much easier than the initial process of spinning. Since Egyptian spinners of flax are plying two or more naturally twisted fibers, their attention was not as directed, and as is shown in a tomb painting in Beni Hasan, they could handle two spindles at a time, a feat very few, if any, modern spinners would be able to accomplish or have even tried. (Figure 4.10)

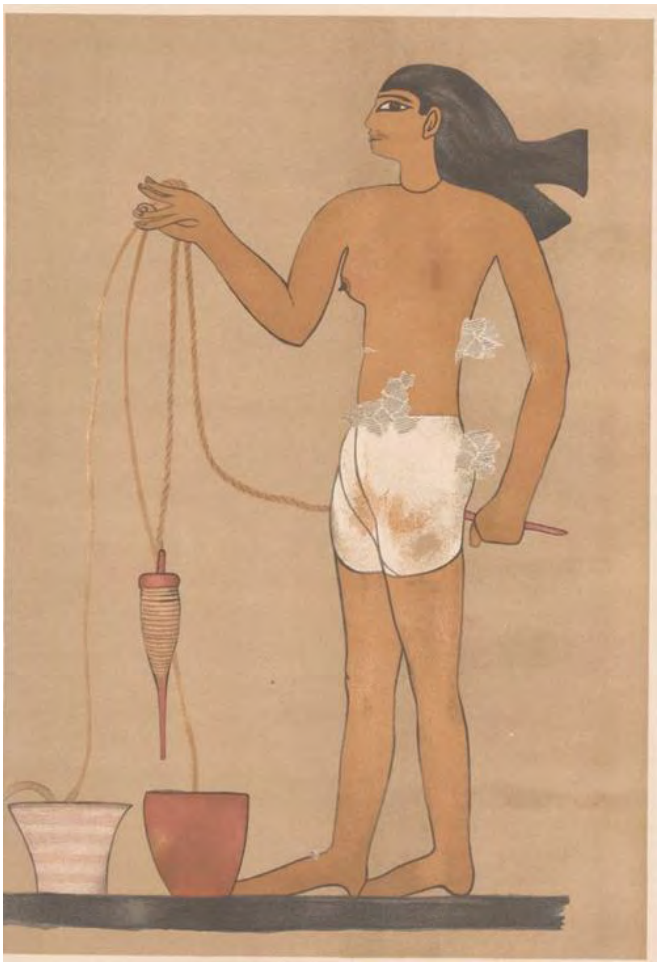

FIGURE 4.8 - Spinner plying yarn using a yarn wet bowl. Beni Hasan tomb (Tomb 3). Plate XV from Newberry and Fraser's book *Beni Hasan* vol. 4. (1893).

[70] Barber, *Prehistoric Textiles*, 48.

FIGURE 4.9 - Ancient Egyptian bowl with hooks for wetting linen fibers during spinning. Rosicrucian Museum, San Jose, California. Picture by Dvortygirl. Creative Commons.

FIGURE 4.10 – Drawing of a spinner with two spindles from the Tomb 17 of Beni Hasan. Plate XIII from Newberry and Fraser's book *Beni Hasan* vol. 2. (1893).

Looms and Weaving

Most people have done some weaving in their lifetimes, even if it is just a paper mat in school. Weaving textiles involves basically the same technique. It utilizes two sets of threads, one which is fixed and held in tension called the "warp," and the other which is interlaced with the warp, called the "weft."[71] The fixed nature of the warp is what differentiates weaving from other forms of textile creation, such as plaiting and basketry. To provide the tension needed to keep the warp taut, one must use a loom.[72] Looms can be simple, utilizing two tree branches or roof beams, or elaborate, such as a multi-shaft dobby or card-driven jacquard loom of the 18th and 19th centuries. In all cases, the weaver decides on the quality of cloth to be woven and calculates the number of warp strings per inch, the finer the cloth the higher number of warp strings per inch. The weaving process begins with the winding of the warp which is of a fixed length and width with an interlocking cross at one end. Winding the warp can be done between two branches of a tree, or in the case of the funerary model of a weaving workshop found in the Tomb of Meketre, between several warp pegs drilled into the wall of the workshop. (Figure 4.11)

After the warp is wound, it is placed on the loom. R.J. Forbes in his textile volume of *Studies in Ancient Technology* says that during the Bronze Age and early Iron Age Egypt in the Levant, there were only a few types of looms in common use: the ground loom, the warp-weighted loom, and the vertical two-beam loom.[73] Due to the size of the

[71] Some people know the term "woof" for the threads that cross the warp. Both "woof" and "weft" come from the same Old English root and are related to the both the words weave and web.
[72] Barber, *Prehistoric Textiles*, 79.
[73] Forbes, *Studies in Ancient Technology*, 198-203.

textiles needed for the canopies of the *Mishkan* and the portability of the looms, we will begin our discussion with the ground loom.

FIGURE 4.11 – Weaver's workshop from the Tomb of Meketre found in the National Museum of Egyptian Civilization, Cairo. Photo by Merja Attia. Used with the permission of the photographer. (2022).

The ground loom is one of the simplest and most portable of all looms. Comprised of just a few sticks in the ground, the ground loom can weave very narrow or wide fabrics of varying lengths. For example, there are some Egyptian linens which are "as much as 9 feet wide and 75 feet long…[and set at a] hundred threads to the inch, using more than 153 miles of yarn."[74] Because of their portability, ground looms remain in use even today, especially amongst nomadic peoples such as the Bedouin.[75] Unlike many other looms, if the weaving space is needed for other home tasks or as a sleeping space, the entire loom and its warp can be rolled up and placed to the side.

[74] Barber, *Women's Work*, pg. 196.
[75] A. Allan Degen and Shaher El-Meccawi, "Ground Loom Weaving Among Negev Bedouin Women," essay, in *Artisan and Handicraft Entrepreneurs* (Cham, Switzerland: Springer, 2022), 3–32, 6-14.

After the warp is placed on the loom, a heddle is created. In its simplest form, specific warp threads are lashed onto a heddle stick. The heddle is then lifted, thereby raising those threads so that the weft can be passed easily underneath them and over others to form a pattern. When the heddle is not in use, it rests on a heddle jack. (FIGURE 4.12)

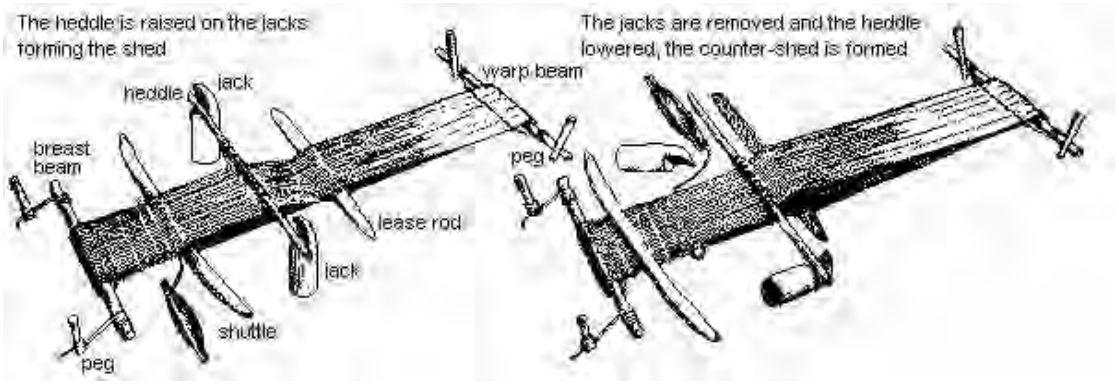

FIGURE 4.12 - H.E.Winlock's working model of a Middle Kingdom horizontal loom which shows heddles and heddle jacks. (1922). Creative Commons.

The common over-under-over-under/under-over-under-over pattern creates what is called a “tabby weave” or “plain weave.” By varying the number of warp threads that are lifted, one can create various patterns such as twills. (Figure 4.13)

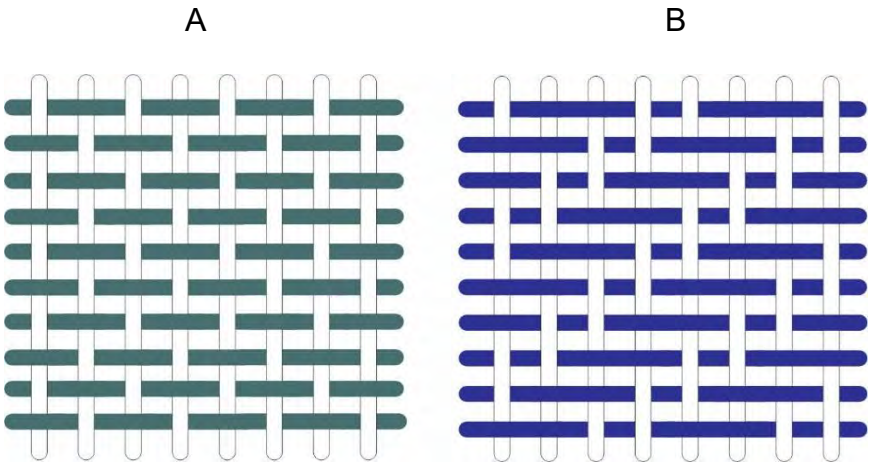

FIGURE 4.13 – A) Drawing of Tabby or Plain weave B) Drawing of 2x2 twill weave. Drawing by the Author.

FIGURE 4.14– One of the author's weaving students working on a modern rigid heddle loom. The student has lifted the heddle and is passing the shuttle between the two layers of warp strings. (Photograph from the Author's collection.) (2019).

The length of warp can be quite short or extremely long. This warp is wound onto the warp beam. The warp beam and the breast beam are then lashed onto pegs inserted into the ground, creating a tight tension between the two beams. The weaver sits near the breast beam and begins feeding the weft, by use of a shuttle, between the two layers. In between each weft pass a beater stick is used to compact the weft.

FIGURE 4.15 – One of the Author's weaving students weaving on a modified Bedouin style ground loom at Temple Shalom, Chevy Chase, MD. (Photograph from the Author's collection.) (2019).

In several tombs there are many depictions weavers working on what many early Egyptologists thought were vertical two-beam looms (Figure 4.16) However, after further inspection, many believe they now show weavers working on ground looms which, due to the limitations of the Egyptian art style, were drawn in a vertical manner.[76] If we consider these images to be of ground looms, it would then represent the widespread use of the ground loom throughout the Middle Kingdom and gives a greater understanding of how they were operated. Much like the Bedouin weavers of today, two

FIGURE 4.16 - Women weaving on a ground loom. Tomb of Khnumhotep, by Norman de Garis Davies. (MET, 33.8.16). Creative Commons.

or more people operated the loom.[77] As depicted in Figure 4.16 and in the model in Figure 4.11, one woman would raise the heddle, while the other woman would pass the weft back and forth and beat it down. The speed of weaving would increase with the use

[76] Barber, *Prehistoric Textiles*, 83.
[77] Degen and El-Meccawi, ”Ground Loom Weaving,” 11.

of two or three weavers instead of one.[78] This will become important as we begin to look at the numbers of weavers required to create the *Mishkan.*

Although it seems that many woven fabrics would have been created on a ground loom, archeological evidence shows that the vertical two beam looms began to enter Egyptian weaving workrooms by the 19th Dynasty.[79] As tapestry weaving techniques moved from Mari, Ebla, Ur, and the Levant, so did their vertical looms.[80] Some were warp-weighted, meaning the fabric would be woven from the top down, with the newly created fabric wound neatly on the top beam. This loom became prevalent later in Greece and is frequently seen on Grecian urns.[81] Joanna S. Smith, in her article "Tapestries in the Bronze and Early Iron Ages of the Ancient Near East," theorizes that most tapestry-like fabric of this period would have been woven on a vertical two-beam loom.[82] Elizabeth Barber also outlines the usage of these looms in her book *Prehistoric Textiles the Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean.* She states that unlike the ground loom, where women are frequently shown as the weavers, men are usually seen as the weavers of the vertical two-beam loom. (Figure 4.17) In contrast to the warp-weighted loom, the weaver on a vertical two-beam loom weaves the cloth from the bottom up, not the top down.[83] Based

[78] I have seen this same configuration naturally occur in my weaving classes, especially when one child does not have the dexterity to hold the rigid heddle aloft and throw the shuttle. When this happened, another child would inevitably come to help, raising the heddle high, while the first child threw the shuttle. With two working in tandem, the team progressed much further than the single weaver alone.
[79] Barber, *Prehistoric Textiles,* 113-115.
[80] Joanna S. Smith, "Tapestries in the Bronze and Early Iron Ages of the Ancient near East," *Textile Production and Consumption in the Ancient Near East*, January 11, 2013, 161–88, https://doi.org/10.2307/j.ctvh1dvx0.13, 164.
[81] Forbes, *Studies in Ancient Technology*, 203.
[82] Smith, "Tapestries," 163-165.
[83] Barber, *Prehistoric Textiles,* 113-115.

on Figure 4.17 and other depictions of the vertical two-beam loom,[84] it appears that if the given width of the cloth was quite large, two weavers would be employed. This is supported by Ur III administrative textile texts which often list two or three weavers depending on the size and scope of the fabric.[85] Based on my understanding of the texts, it seems that the wider the width the more weavers were required. Therefore, one can hypothesize that based on the size and scale of the textiles of the *Mishkan*, if they were not woven on a ground loom, they would have been woven on a vertical two-beam loom with at least two or three weavers working.

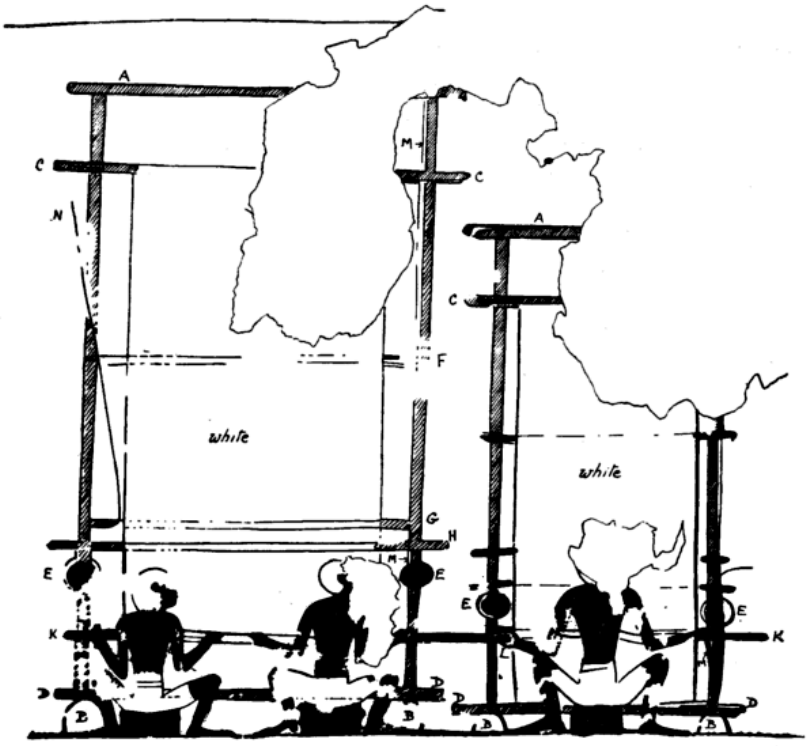

FIGURE 4.17 - Upright or Vertical Looms from the Tomb of Thot-nefer at Thebes, XVIII. Dynasty, *circa* BCE 1425. Figure 9 by Mr. N. de G. Davies found in H. Ling Roth's book *Ancient Egyptian and Greek Looms.* (1913).

[84] For another example, one can see a tomb painting of the weaving workshop from the Tomb of Neferronpet on page 114 in Barber's *Prehistoric Textiles*. It depicts four vertical two-beam looms, half of which are manned by two weavers.
[85] Richard Firth and Marie-Louise Nosch, "Spinning and Weaving Wool in Ur III Administrative Texts," *Journal of Cuneiform Studies* 64, no. 1 (January 2012): 65–82, https://doi.org/10.5615/jcunestud.64.0065.

Chapter 5

THE DYEING PROCESS AND DYES

Exodus 25:4

ד וּתְכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ וְעִזִּים׃

[4]Blue, purple, and scarlet yarns, linen, and goat's hair,

The process of dyeing fibers, yarns, and fabrics has become a simple one since the mid-19th century when the first synthetic dyes were created. One just needs to go to their local craft store, pick up a bottle or box of dye, go home, fill a sink or bucket and soak the fabric, and then throw it into the washer to remove the excess dye. In fact, the whole dying process can be done in a washing machine with a little vinegar added to help fix the dye.

FIGURE 5.1 – The Author's weaving students space-dying yarn for their weaving projects. (Photography from the Author's collection.)

Before the invention of synthetic dyes, the process was not only time-consuming but also very smelly. The dyer needed to (1) find the correct plants, earth, metals, and minerals to create the desired color, (2) add the correct ingredient for a mordant or fixative, (3) heat the mixture, (4) add the fibers, yarn, or fabric to the mix and, finally, (5) wait several hours or days for the article to absorb enough dye. Once it had achieved the desired shade, it was rinsed over and over in water to remove the excess dye. It appears that ancient dyers were not only craftsmen, but chemists, botanists, and magicians as well.

Although the dyestuffs have changed over the centuries, the basic process of dyeing fibers, yarns, and fabrics has not. Each type of fiber and dyestuff requires a slightly different dyeing process. For example, natural dyes are one of two kinds: either direct dyes where the dyestuff alone is enough to create colorfast dye or mordant dyes that require special additives, such as acid like vinegar or a developer like alum, to create colorfastness. These additives are especially necessary when dyeing with plants and could be very messy and smelly, such as the use of urine as a mordant for indigo. In all cases, the dyestuffs are heated slowly and simmer for many hours or days to fully release the dye at which point the fabrics or hanks of yarn would be placed in the dyebath. They would then need to sit for many days while they absorb the dyes and the desired color is achieved after which they are removed and rinsed again and again.[86]

Barber explains in her chapter on dyes in *Prehistoric Textiles* that it may have been either the smell or the large amounts of water needed for rinsing that caused

[86] Barber, Prehistoric *Textiles,* 235-239.

many ancient dye-works to be located near windy mountains or beaches. The availability of water is a must because even before the materials can be dyed they must be cleansed of grease and dirt. Some dyestuffs must be dried (such as *kermes* and *murex*) and then ground into a fine powder with a mortar and pestle. Dying was an active industry in most places and the dye vats of the ancients were very large as seen at Tel Beit Mirsim in the lowlands of Mount Hebron in Israel where a large textile complex of dye vats, tanks, channels, and loom weights were discovered.[87] (Figure 5.8)

FIGURE 5.8 – A large dye vat, ca. 1000 BC, is measured at Tel Beit Mirsim. From the G. Eric and Edith Matson Photographic Collection, 1920. Library of Congress. Creative Commons.

Many dyes can be made from easily acquired sources such as flowers, spices, and onion skins but they tend to not retain their color over time.[88] Therefore, one can postulate that the four colors described in the *Mishkan:* white, scarlet red, purple, and blue would not be made of dirt or a common plants as the colorfastness of the textiles

[87] Barber, *Prehistoric Textiles*, 239-243.
[88] Sara Toth Stub, “The Price of Purple,” *Archaeology* 73, no. 6 (2020): 59–64, 63.

was important. Especially saturated and colorfast versions, known as “true” colors, were costly and difficult to make and were often reserved for the elite and royalty. In fact, the English name for Tyrian purple is “royal purple” which connotes certain cultural images, such as kings and queens in long robes.

These four colors were also thought to embody sacred elements. Both Philo and Josephus noted that they had mystical and cosmological significance. They symbolized: earth (as flax grows from the earth), sea/water (as purple comes from the sea snail), air (blue is the color of the sky), and fire (scarlet red is reminiscent of fire).[89] Other surrounding cultures also found religious significance in the colors blue, white, and red, using them not only for their powers of healing but also divination.[90]

As we will see, there are other dyestuffs that could achieve a similar color with less mess, cost, and work, but if the Pharoah, a supposed God on earth was worthy of such fabrics, why would the God of the Israelites deserve less? To truly believe in YHVH and be in covenant with God as God’s vassal, one would want to use the most costly and rare dyestuffs to create the fabric of the *Mishkan*. Anything less would be a betrayal of the newly formed relationship created between the Israelites and YHVH.

[89] Mony Almalech, “Cultural Unit Blue in the Old Testament,” *Language and Semiotic Studies* 9, no. 2 (May 31, 2023): 185–223, https://doi.org/10.1515/lass-2023-2001, 194.
[90] Yeşim Dilek and Pınar Gözlük Kırmızıoğlu, “Varicolored Wool in Ancient Treatment Rituals,” *İstanbul Antropoloji Dergisi / Istanbul Anthropological Review* 0, no. 0 (December 13, 2022): 0–0, https://doi.org/10.26650/iar2022-1183927.

White Linen

As stated in the previous chapter, the color and quality of linen depend on when the flax is harvested and how it is processed. Early harvested flax will have a natural green tint and late harvested flax can become a golden caramel color.[91] To achieve the brilliant bright white of Egyptian flax, often associated with purity, "supremacy, peace, happiness, death and mourning," it must undergo several washings followed by exposure to the intense sun of the desert climate.[92] The process to achieve the perfect bright white would be costly and only the wealthiest Egyptians would have been able to afford it, including, of course, the Pharoah. Although not as costly as the other dyestuffs, bright white, fine linen might be the only linen the Israelites would designate as suitable enough to grace the earthly home of YHVH.

Tolaat Shani – Scarlet Red - תּוֹלַעַת שָׁנִי

Recently, in the Cave of Skulls, west of the Dead Sea in the Judaean Desert of Israel, a number of Middle Bronze Age and later textiles have been found ranging from baskets to fine woven fragments. Several of the small woven fragments from the Middle Bronze Age have a red wool weft, dyed scarlet red, which was woven onto a linen warp, not unlike the textiles described in Exodus. *Tolaat shani* "תּוֹלַעַת שָׁנִי," often translated as scarlet red, is a compound noun combining the word *tolaat*, "worm" or "grub" and *shani*, "red," so it is literally "the red of a worm." However, this "worm" is not a worm at

[91] Forbes, *Studies in Ancient Technology*, 29.
[92] Rasha Kamel Soleman, "The Central Role of White Linen in Ancient Egyptian Women's Dresses & Fashion," *مجلة كلية الآداب. جامعة القاهرة للدراسات الإنسانية* 7, no. 7 (June 1, 2020): 1–20, https://doi.org/10.21608/mkaf.2020.125642.

all, but an aphid (Figure 5.2), called a *kermes,* which in addition to its close cousin *cochineal,* has been used throughout the world for millennia as a way to color fibers, textiles, and even food,[93] a scarlet or orange red.[94]

FIGURE 5.2 - *Kermes* aphids on a tree trunk. By Y. Ben-Dov and M. Spodek. 2012 Creative Commons.

Zohar Amar explains in his article “The Scarlet Dye of the Holy Land” that since the name itself contains the word “worm,” researchers began to assume that this biblical color was not the more prevalent deep red of the madder root, but the red created by crushing *Kermes echinatus or Kermes vermilio*, that lives on the Kermes oak trees in modern-day Israel. (FIGURE 5.3) Archeological evidence, like that found in the Cave of Skulls, has recently been tested using high-pressure liquid chromatography proving the

[93] There are many foods today, such as yogurt, fruit drinks, and candies which are colored with *cochineal*, also known as Natural Red No. 4. Look for it!
[94] Zohar Amar et al., “The Scarlet Dye of the Holy Land,” *BioScience* 55, no. 12 (2005): 1080, https://doi.org/10.1641/0006-3568(2005)055[1080:tsdoth]2.0.co;2, 1080.

widespread use of the *kermes* aphid and giving credence to the belief that *tolaat shani* was created through the crushing of the *Kermes* aphid.[95]

FIGURE 5.3 – A Kermes oak tree located in the Alonei Abba Nature Reserve in Northern Israel. By Avishai Teicher 2006. Creative Commons.

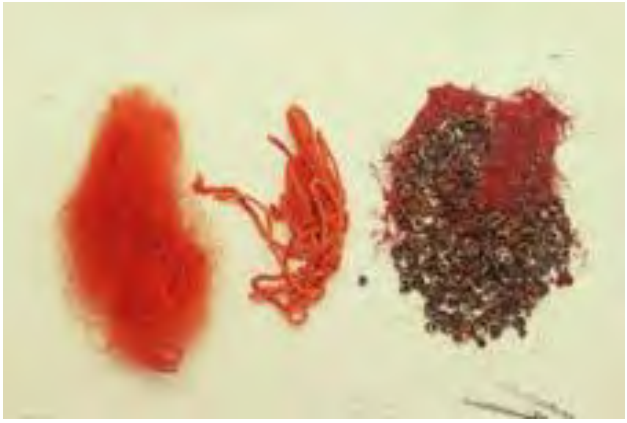

FIGURE 5.4 - Photo of dyed wool made by Professor Zohar Amar of the Department of Land of Israel Studies and Archaeology at Bar-Ilan University, Israel. 2021. Creative Commons.

[95] Amar, “The Scarlet Dye of the Holy Land,” 1080.

Argaman – Purple - אַרְגָּמָן

Purple, unlike red or blue, is not a primary color, and die-stuffs for non-primary colors are difficult to find in nature. One can then assume that ancient dyers often used an over-dyeing technique to achieve purple, first coloring the fibers or fabrics a red color, often made of madder, and then over-dyeing them again in blue from either the Woad or Indigo plant.[96] However, it was very difficult to achieve consistency throughout the multiple dye baths as everything from the moisture level of the fibers to the length of time they remain in the dye bath can influence the resulting color. Moreover, if the dyer needed to create a large run of purple items that would need to have been dyed in multiple batches, the resulting product would be unsatisfactory. [97] Yet, several textile fragments containing this form of purple were found in the 1st-7th Century Egyptian burial grounds at Fag el-Gamous which shows that people of lesser means long sought purple clothing just like the elite.[98]

During the Bronze Age though, another dyestuff was used to create a "true" purple, the crushed hypobranchial gland of one of three types of *murex* sea snail, the *Hexaplex trunculus, Bolinus brandaris,* or *Stramonita haemastonia*.[99] (Figure 5.5) The resulting color was called Tyrian or "royal" purple as it was historically believed to have

[96] Forbes, *Studies in Ancient Technology,* 137.
[97] As someone who has purchased a lot of ugly yarn, over-dying is a common method for most dyers. If you do not have the color you need, you create it through color theory. As stated above, however, trying to attain a uniform color through several dye baths is difficult and often foolhardy.
[98] Bethany Jensen et al., "They'll Never Be Royals: The 'Purple' Textiles of Fag El-Gamous," *Excavations at the Seila Pyramid and Fag El-Gamous Cemetery*, November 18, 2019, 207–48, https://doi.org/10.1163/9789004416383_011, 207-208..
[99] Naama Sukenik et al., "Early Evidence of Royal Purple Dyed Textile from Timna Valley (Israel)," *PLOS ONE* 16, no. 1 (January 28, 2021), https://doi.org/10.1371/journal.pone.0245897, 2.

FIGURE 5.5 – The three types of murex sea snail and the color that it produces. On display at Museum of Natural History in Vienna. Creative Commons.

originated in the Phoenician city-state of Tyre in modern-day Lebanon.[100] Only recently, since the late 20th century, have researchers begun to believe that the Minoans not the Phoencians, were the first to produce Tyrian purple on a large scale, sometime around 2000 BCE.[101] Sara Toth Stub explains in her article "The Price of Purple" that regardless of who was the first to utilize the *murex* snail as a dyestuff, the cost of *murex* purple is legendary. Textiles and dyestuffs made from the *murex* snail are listed in trade and tax records alongside other valuable commodities like gold and other precious metals. It was even used to form alliances as seen in 12th century BCE administrative documents from Ugarit.[102] The use of the *murex* snail to create purple flourished until

[100] Franz Lidz, "In Israel, a 3,000-Year-Old Purple Factory," *The New York Times*, March 5, 2024, https://www.nytimes.com/2024/03/05/science/archaeology-tyrian-purple-murex.html?smid=url-share.
[101] Chris Cooksey, "Recent Advances in the Understanding of the Chemistry of Tyrian Purple Production from Mediterranean Molluscs," essay, in *Treasures from the Sea* (London: Oxbow Books, 2017), 73.
[102] Stub, "The Price of Purple, 60.

the Middle Ages when other, less costly and time-consuming methods were found, thereby leaving the precise recipe a mystery with only a few clues found in the descriptions of later historians such as those by Pliny the Elder.[103]

In the 1960s and 1970s, archeologists found dozens of pieces of pottery colored and stained with purple and blue dye in Tel Shikmona, near Haifa on Israel's Mediterranean coast.[104] Although this site is from the early Iron Age, the proliferation of shells and the size of the operation suggest that this was an "industrial site" for many years, possibly created by the Phoenicians to expand their monopoly on this valuable product.[105] In addition to the many pieces of stained pottery they also found weaving and spinning equipment, such as loom weights and spindle whorls. Initially, archeologists were more interested in the other buildings on the site that produced olive oil, but recent discoveries of large numbers of *murex* shells and improvements in testing abilities have led to a renewed interest in the purple-stained pottery shards (Figure 5.6), the majority of which are stained with dye from the gland of the *Hexaplex trunculus* snail.[106]

FIGURE 5.6 - Murex shells from the Iron Age II period (10th-7th centuries BCE) with remains of purple on the shards seen on the right. National Maritime Museum, Haifa, Israel. (2021). Creative Commons.

[103] Inge Boesken Kanold, "Dyeing Wool and Sea Silk with Purple Pigment from Hexaplex Trunculus," essay, in *Treasures from the Sea* (London: Oxbrow, 2017), 67–72, 67.
[104] Stub, "The Price of Purple," 60.
[105] Ibid.
[106] Ibid, 63.

Purple wool fibers, yarn, and woven fragments were also found in an early Iron Age site of an ancient copper smelting camp in the Timna Valley in Israel.[107] Although the site dates to the late 11th century BCE, many of the fibers, yarns, and textiles found there date to the Bronze Age, ca. 1340 BCE.[108] They include not only the wool of sheep, but goats' hair and linen, all dyed with *murex* dyes. The finds from the Timna Valley may be the only current archeological evidence of Bronze Age use of "true purple" in the Levant, still it strengthens the theory that *argamon* was created with dye from the *murex* snail.[109]

Tekhelet – Blue – תְּכֵלֶת

There appears to be a general consensus among most scholars that the probable source of *tola'at shani* was the *kermes* aphid and for *argamon*, the *murex* snail.[110] Regarding *tekhelet* there remains much mystery around the probable source with scholars proposing three main candidates: woad, made from the flowers of the mustard plant; indigo, made from the leaves of the indigo plant; or the gland of the *murex* snail. The controversy stems from several sources, the first being that unlike Tyrian purple and scarlet red, that no archeological records of the recipe and process have not survived. Although the Talmud provides some information, it is believed that the process was eventually lost sometime in the 7th or 9th centuries CE.[111] In tractate

[107] Vanessa Workman et al., "Textile Production, Consumption, and Trade in Early Iron Age Copper Smelting Sites at Timna, Israel : A Preliminary Summary of Results ," *Archaeological Excavations and Research Studies in Southern Israel* 6 (2023): 47–60.
[108] Workman, "Textile Production," 53.
[109] Workman, "Textile Production," 56-57.
[110] Sukenik, "Early Evidence of Royal Purple," 4.
[111] Gadi Sagiv, "Deep Blue: Notes on the Jewish Snail Fight," *Contemporary Jewry* 35, no. 3 (May 24, 2015): 285–313, https://doi.org/10.1007/s12397-015-9138-1.

Menachot 44a the Sages taught that *tekhelet* was a sky-blue color of great cost that was created with the blood of the *chilazon,* which is described as a fish that only appears once every 70 years. Both Marcus Jastrow and Ernest Klein in their dictionaries, define חִלָזוֹן, *chilazon,* as a snail.[112] Archeological evidence from the Bronze Age fuels the argument for the use of woad and indigo as the source of *tekhelet* as both were used frequently in Ancient Egypt to create the color blue and obtaining a true-blue color from the *murex* snail seemed all but impossible. Nevertheless, recent discoveries, such as those in Tel Shikmona*,* now lead many researchers to think that the *murex* snail was not only the source of *argamon*, but also *tekhelet*.[113]

From almost the moment that the recipe for *tekhelet* was lost, biblical scholars have attempted to recreate it using various creatures from the sea. The most interesting case is that of Rabbi Leiner who, in the late 19th century, thought that the dye was produced by the ink of a cuttlefish, not a snail. After setting up a factory to mass-produce *tekhelet tzit-tzit*, or ritual fringes, it was discovered that the color he created was not created from the ink, but from a synthetic fixative material which was added to the dye bath.[114] Other researchers and scholars have succeeded in creating a myriad of violet or blue-purple colors from the glands of the *murex* snail, but not the sky-blue

[112] Marcus Jastrow, *A Dictionary of the Targumim, the Talmud Babli and Yerushalmi, and the Midrashic Literature* (1995 ,חורב :ירושלים).

Ernest Klein and Baruch Sarel*, A Comprehensive Etymological Dictionary of the Hebrew Language for Readers of English* (New York, London: Macmillan ; Collier Macmillan, 1987).

[113] Sagiv, “Deep Blue: Notes on the Jewish Snail Fight, 284-313.

[114] Baruch Sterman and Judy Taubes Sterman, *The Rarest Blue: The Remarkable Story of an Ancient Color Lost to History and Rediscovered* (Jerusalem: Ptil Tekhelet, 2017), 11-14.

described in rabbinic sources. It seemed that either the description was inaccurate or that there was a piece missing.[115]

Finally, in the 1980s, scientists were able to create an indigo-blue dye from the *murex* snail. Although the modern *tekhelet* creation myth relies on an unbelievable story of accidental discovery, in truth, since the 1960's several Israeli chemists and researchers have been trying to discern the chemical secrets of *tekhelet*. It wasn't until 1987, when two researchers Otto Elsner, a textile expert, and Ehud Spanier, a marine biologist from the University of Haifa, were able to create a sky-blue color by exposing the dye solution to sunlight, that the missing ingredient, UV light, was found. (Figure 5.7)

FIGURE 5.7- Wool dipped in *tekhelet* solution turning blue in the sunlight outside P'til Techelet headquarters in Israel. 2005. Creative Commons.

In 1991, Ptil Tekhelet, a research company, was founded by three American Orthodox Jews, to further the study and produce *tekhelet* dye from the *murex* snail. Many people still question Ptil Tekhelet's research but in light of several recent

[115] Sterman, *The Rarest Blue*, 13.

archeological finds, such as Tel Shikmona and Timna, the argument against the *murex* snail is no longer as solid and many researchers and Orthodox Jews have supported the findings and work of Ptil Tekhelet using the glands of the *murex* snail combined with UV light.[116]

Even today the price of pure *murex* dye is astronomical, costing thousands of dollars for just a gram and dyers say that the smell isn't any better than it was in antiquity.[117] The time and the number of snails that it takes to create even a bit of the dye is overwhelming. It takes approximately 120 pounds of *murex* snail glands to create one gram of dye which in turn can dye 10-15 grams of fabric, the equivalent of one long sleeve.[118] Yet, the archeological and textual evidence continues to point toward the *murex* snail as the source of *tekhelet* as well as *argamon*. Ghassen Nouira, an amateur *murex* snail dyer who lives in a Tunis suburb says, "Even after 12 years' experience, it is still a magical process."[119] As we continue to think about the *Mishkan* and its significance to the Israelites, we can only imagine that they too would have seen the value of using this dye to create the fabrics for the *Mishkan*. Perhaps they shared that magical moment of watching the blue and purple colors miraculously appear before their eyes; realizing that this dye was definitely made for kings and rulers. That it was truly fit for YHVH, the sovereign of the Israelites who miraculously lead them out of Egypt and into freedom.

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[116] Sagiv, "Deep Blue: Notes on the Jewish Snail Fight," 292-294.
[117] "Smelly Snails and Deep Purple: This Ancient Dye Costs $2,700 per Gram," *Middle East Eye*, accessed February 6, 2025, https://www.middleeasteye.net/discover/colour-purple-dyeing-techniques-phoenician-sea-snails.
[118] Ibid.
[119] "Smelly Snails and Deep Purple," *Middle East Eye*.

Chapter 6

WEAVING THE *MISHKAN*

Exodus 25:8

ח וְעָשׂוּ לִי מִקְדָּשׁ וְשָׁכַנְתִּי בְּתוֹכָם׃

[8] And they shall make for me a holy place and so that I may dwell among them.

As stated in the Chapter 3, the *Mishkan* was, in essence, a large tent with a surrounding fence-like enclosure that relates to other Egyptian tents of the period, such as Rameses' II war tent, as depicted at Kadesh. Necessity forced the Israelites to construct a sanctuary to YHVH that would be moveable. So, like the Bedouins and other nomadic cultures, they needed to primarily use fabric that could be folded compactly and placed on a cart. As described in Exodus 27:9-19, the *Mishkan* complex comprised of a central tent surrounded by an outer wall and gate made completely of fabric and

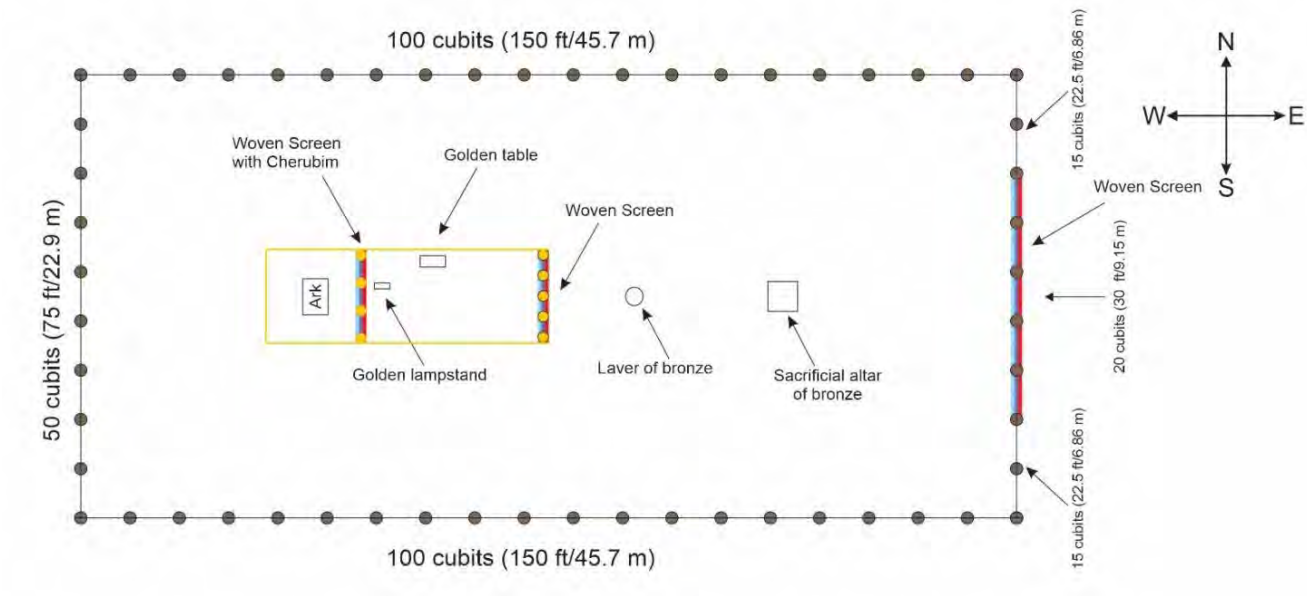

FIGURE 6.1 – Diagram of the *Mishkan* and its enclosure. Drawn by the Author.

acacia wood stanchions. The tent structure, described in Exodus 26, was created with wood planks and locking bars covered in several layers of fabric and leather. The tent itself was split into two sections (see Exodus 26:31-37): The Holy of Holies, where the Ark was kept, and the Holy Place, where the lampstand and table were housed. The doorway and the partition were made of fabric. (Figure 6.1) Similar fabrics were used to construct the priestly garments, however this project will not address those textiles. Although the description of the textiles needed for the *Mishkan* found in Exodus begins with the Inner Cherubim layer of the tent, we will begin our discussion from the outer layers inward as their weave structures are less complicated. We start with the weaving of the cloth for the outer enclosure.

The Enclosure

Exodus 27:9-19

ט וְעָשִׂיתָ אֶת חֲצַר הַמִּשְׁכָּן לִפְאַת נֶגֶב־תֵּימָנָה קְלָעִים לֶחָצֵר שֵׁשׁ מָשְׁזָר מֵאָה
בָאַמָּה אֹרֶךְ לַפֵּאָה הָאֶחָת: י וְעַמֻּדָיו עֶשְׂרִים וְאַדְנֵיהֶם עֶשְׂרִים נְחֹשֶׁת וָוֵי הָעַמֻּדִים
וַחֲשֻׁקֵיהֶם כָּסֶף: יא וְכֵן לִפְאַת צָפוֹן בָּאֹרֶךְ קְלָעִים מֵאָה אָרֶךְ וְעַמֻּדָו]וְעַמּוּדָיו[
עֶשְׂרִים וְאַדְנֵיהֶם עֶשְׂרִים נְחֹשֶׁת וָוֵי הָעַמֻּדִים וַחֲשֻׁקֵיהֶם כָּסֶף: יב וְרֹחַב הֶחָצֵר
לִפְאַת־יָם קְלָעִים חֲמִשִּׁים אַמָּה עַמֻּדֵיהֶם עֶשֶׂר וְאַדְנֵיהֶם עֶשֶׂר: יג וְרֹחַב הֶחָצֵר
לִפְאַת קֵדְמָה מִזְרָחָה חֲמִשִּׁים אַמָּה: יד וַחֲמֵשׁ עֶשְׂרֵה אַמָּה קְלָעִים לַכָּתֵף עַמֻּדֵיהֶם
שְׁלֹשָׁה וְאַדְנֵיהֶם שְׁלֹשָׁה: טו וְלַכָּתֵף הַשֵּׁנִית חָמֵשׁ עֶשְׂרֵה קְלָעִים עַמֻּדֵיהֶם שְׁלֹשָׁה
וְאַדְנֵיהֶם שְׁלֹשָׁה: טז וּלְשַׁעַר הֶחָצֵר מָסָךְ ו עֶשְׂרִים אַמָּה תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת
שָׁנִי וְשֵׁשׁ מָשְׁזָר מַעֲשֵׂה רֹקֵם עַמֻּדֵיהֶם אַרְבָּעָה וְאַדְנֵיהֶם אַרְבָּעָה: יז כָּל־עַמּוּדֵי
הֶחָצֵר סָבִיב מְחֻשָּׁקִים כֶּסֶף וָוֵיהֶם כֶּסֶף וְאַדְנֵיהֶם נְחֹשֶׁת: יח אֹרֶךְ הֶחָצֵר מֵאָה
בָאַמָּה וְרֹחַב ו חֲמִשִּׁים בַּחֲמִשִּׁים וְקוֹמָה חָמֵשׁ אַמּוֹת שֵׁשׁ מָשְׁזָר וְאַדְנֵיהֶם נְחֹשֶׁת:
יט לְכֹל כְּלֵי הַמִּשְׁכָּן בְּכָל עֲבֹדָתוֹ וְכָל־יְתֵדֹתָיו וְכָל־יִתְדֹת הֶחָצֵר נְחֹשֶׁת:

[9] You shall make the enclosure of the *Mishkan*. On the south side curtains for the enclosure of fine-spun linen, 100 cubits long for that one side. [10]And its twenty posts with twenty copper sockets, and hooks and bands of the posts to be of silver. [11]And likewise, for the north side a length of curtain of 100 [cubits] long and its 20 posts with twenty copper sockets, and hooks and bands of the posts to be of silver. [12]And for the width of the enclosure on the west side, curtains 50 cubits [long and] its tent posts and their ten sockets. [13]And for the width for the front of the enclosure on the east side, 50 cubits. [14]And 15 cubits of curtains on one shoulder with its three posts and three sockets. [15]And on the other shoulder, 15 cubits of curtains with its three posts and three sockets. [16] And for the gate of the enclosure a screen of 30 cubits in blue, purple, and scarlet red and fine spun linen, the work of a weaver, and its four posts and four sockets. [17] All the posts of the enclosure will have bands of silver around them and their hooks will be of silver and their sockets shall be of copper. [18]The length of the enclosure will be 100 cubits and the width shall be fifty by fifty and the height shall be five cubits [with curtains made] of fine spun linen and their sockets shall be of copper.[19]And all the tools of the *Mishkan* for all its work and all its pegs and all pegs of the enclosure shall be of copper.

It states in Exodus 27:9 that the curtains of the enclosure were to be made of finely spun linen,[120] which, as stated in the previous chapter, would have been bright white. The sight of 400 feet of bright white linen blowing in the breeze against the backdrop of the desert would be awe-inspiring. (Figure 6.2) Yet the most intriguing question is how they were woven and assembled.

FIGURE 6.2 – Timna Park Tabernacle Model in Timna Park, Israel. Creative Commons.

Even though ground looms could be quite large, anything beyond six feet wide would be unwieldy for a single weaver and as Egyptian and Near East iconography show, this was seldom done. Weaving can be done with one person, but as stated earlier, on most early looms, a second person would not only be company but would increase the efficiency and speed of the work. (Figure 6.3) In the administrative texts of

[120] I am translating שֵׁשׁ מָשְׁזָר as "finely spun linen" based on several sources (Jastrow, Klein, BDB, the article by Rasha Kamel Soleman, in addition to the entry in the MicClintock and Strong Biblical Cyclopedia Online). As stated in Chapter 4, the word "*sheish*" is derived from the Egyptian word "*sheush*," and usually was the designation of a finer grade of linen. The word "*mashzar*" is translated as "twisted." Other translations suggest that the linen was a six-strand linen yarn, because of the Hebrew word "*sheish*" can also be translated as six. I believe that this similarity is coincidental, and the proper translation of the text is "finely spun linen."

Ur III, two or three women are listed as weavers for each project, many with a width of 3.5 meters or 11 feet.[121] In some modern Bedouin families, three people are used to work the ground loom, one to lift the heddles, two to weave, each one weaving half the width.[122] One can surmise that for the weaving of the panels of the enclosure, at least two, three,

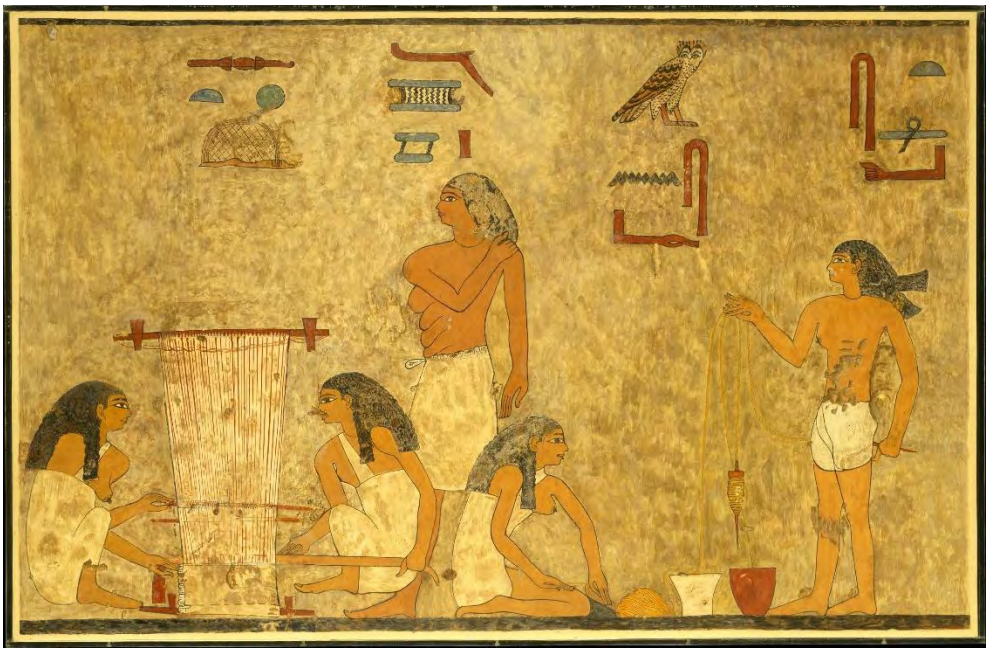

FIGURE 6.3 - Weavers, Tomb of Khnumhotep, by Norman de Garis Davies (MET, 33.8.16). Creative Commons.

or perhaps four women were working each panel. For the first and second tent cloth layers, we will see that the width is capped at four cubits[123], or approximately six feet. We will therefore assume for the sake of this project that the enclosure curtains were created in six-foot sections, which were then joined together to create 150 feet of cloth.

[121] Firth, “Spinning and Weaving Wool in Ur III Administrative Texts.” .
[122] Degen, “Ground Loom Weaving Among Negev Bedouin Women,” 11.
[123] There is much discussion about the actual length of a cubit. For the sake of simplicity, I am using the measurement of 18 inches as used by Nahum Sarna in his commentary on the Book of Exodus. In addition, this measurement of 18 inches aligns with the general cloth widths given in the administrative texts from Ur III. Some scholars believe that a cubit may have been as long as 24 inches, which if true, would greatly increase the size of the fabrics and the outline of the *Mishkan*.

Exodus 27:18 specifies the height of the curtains as five cubits or seven and a half feet. No weaver would want to warp a loom more times than necessary, so one can presume that the weavers of the *Mishkan* wound at least 44 feet of warp onto their looms which, with take-up[124] and hems, would give the weaver five cloths per warp. Therefore, to encompass the entire enclosure, a weaver would be required to weave approximately seventy-one, 6 x 7 ½ foot, cloths.[125]

Since the cloths were striking with their bright white color, the weaver may have seen no need to add any embellishment to the weaving style. The majority of utilitarian fabrics created by the Egyptians were weft-faced tabby or plain-weave. (Figure 6.4) Weft-faced refers to the ratio of warp to weft. When the ratio is balanced, it is called a balanced weave. Warp-faced textiles typically used in banding and decorative weaving, whereas the most common weft-faced textiles are tapestries. It is my experience that when weaving on a ground loom with yarns of similar weight and composition, the act of beating against the breast beam naturally creates a more weft-faced fabric. Therefore, it stands to reason that the curtains of the enclosure may have followed this plan. Decorative weaves, such as basket or twill were typically used in the fabrics for royalty or high officials.[126] One then might make an argument for basket-weave, as many

[124] Take-up is the amount of length lost due to the bending of the warp strings as the weft feeds under and over them. On modern looms, most weavers add ten percent for take-up.
[125] On the east and west sides, there would be a little extra cloth. Either the weaver would change to a slightly narrower warp for the west and east sides or possibly just drape the cloth with an overhang on the sides.
[126] Hanaa A. Al-Gaoudi and Nermin M. Aly, “The Characterization of Some Ancient Egyptian Funerary Linens from the Twenty-First Dynasty Discovered in the Bab El-Gasus Excavation,” *The Journal of Egyptian Archaeology* 107, no. 1–2 (June 2021): 115–28, https://doi.org/10.1177/03075133211022364, 117.

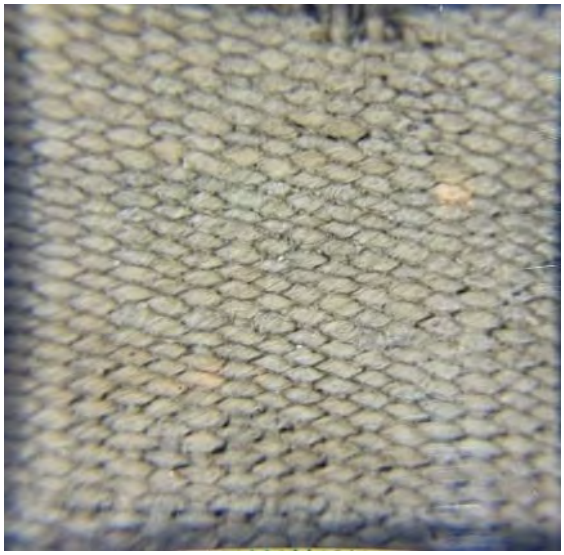

FIGURE 6.4 – Example of weft-face woven ceremonial cloth from the 4th century BCE, Egypt, located in the Costen Textile Collection of The George Washington University Textile Museum. Accession number T-1225a. (Photograph from the Author's collection).

translators translate the word קְלָעִים"k'la-im" as "braided-hangings,"[127] which could refer to basket-weave twill. Yet, there is not enough evidence to assume that they were woven in any other pattern than tabby weave.

Recently, I conducted an experiment to see the time differential between weaving plain-weave and basket weave. I based my experiment on the assumption that the Israelites' ground looms included at least one heddle bar (similar to what is used in Bedouin and back-strap looms, simulated in my experiment by a rigid heddle) and the basket weave was created by "picking-up" the requisite threads. My warp was approximately 16" wide and I used a stick shuttle. I was able to weave 12 rows of plain weave in about five minutes, whereas it took me almost ten to fifteen minutes to weave four rows of basket weave. (Figure 6.5) I believe, that if time was of the essence, as the Sages imply it is[128], the Israelite weavers would not have used basket weave for such a

[127] Menachem Davis et al., *Interlinear Chumash: The Torah, Haftaros and Five Megillos with an Interlinear Translation and an Anthologized Commentary* (Brooklyn, N.Y: Mesorah Publications, 2010), 516.
[128] Midrash Tachuma, Pekudei 11

large project, even though it would have added an additional layer of beauty and interest to the cloth.

FIGURE 6.5 – Plain-weave vs Basket weave experiment by the Author. (Photo from the Author's collection.) (2024).

In relation to the quality of cloth, a very fine cloth would not only be costly and time-consuming to weave in such quantities, but it might not be practical. In contrast, a coarser fabric would not be worthy of YHVH. Once again, based on the Ur III administrative texts, we see that the three weavers could weave approximately 30-50 cm or 11-20 inches of cloth a day on a large (11 feet wide) ground loom. These numbers may not exactly relate to the enclosure curtains, since the weavers of Ur were weaving in wool and the cloth that was woven was 4th and 5th grade, generally heavier and coarser than the Israelites would have used to create the enclosure curtains,[129] but it gives a general idea of the time in which it takes to create such textiles. With a finer cloth and a smaller width, each of the estimated six by seven and a half feet cloths of

[129] Firth, "Spinning and Weaving Wool in Ur III Administrative Texts."

the enclosure would have taken at least three days for three weavers to weave, with the entirety of the cloth needed requiring 213 days. As stated in Chapter 2, *Midrash* explains that the Israelites had anywhere from 70 to 90 days[130] to complete the *Mishkan*. Using this as a framework and allowing for approximately six days for warping the loom (which is the average based on the Ur III texts) it would take three groups of three weavers approximately 77 days to weave the required length of cloth, or four groups of three weavers approximately 60 days. Of course, this does not take into account fiber preparation and spinning. In Exodus 35:5-6 we are told that all the people brought the items that they had to Moses to create the *Mishkan*. This included, as we see in verse six, the yarns needed for weaving.[131]

How much yarn would the Israelites have needed? Although we do not know exactly the quality of the cloth, we can base a calculation on a mid-grade cloth which would have a density of 50 warps per inch and a weft of approximately 60 threads per inch.[132] All weavers, whether in ancient times or today must calculate the amount of resources needed to complete their project. Using these common calculations, we can surmise the total amount of linen yarn needed to weave the outer enclosure of the *Mishkan*. As such, the Ancient Israelites would require 52,800 yards of warp and 190,080 yards of weft. This is approximately 138 miles[133] of yarn or 609 balls[134]

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[130] Midrash Tachuma, Pekudei 11

[131] Exodus 35:25-26 states that the women "spun the yarn with their own hands." We will address this in Chapter 7.

[132] These figures are based on the observations of Hanna A. Al-Gaoudi and Nermin M. Aly in their article *"The Characterization of Some Ancient Egyptian Funerary Linens from the Twenty-First Dynasty Discovered in the Bab El-Gasus Excavation"* and the research that the author conducted at The George Washington Textile Museum in 2024. A coarse cloth would have a warp of 20 threads per inch and the finest cloth would have between 100 and 200 warps per inch.

[133] For reference, the distance between Washington D.C. and Philadelphia is approximately 139 miles on I95.

[134] This figure is based on the general ball size of 312 yards per ball of lace-weight fine linen yarn.

of linen yarn, similar to those found in the Metropolitan Museum of Art's Egyptian collection.[135] (Figure 6.6)

FIGURE 6.6 – Ball of Egyptian linen yarn weaving yarn circa 1295-1070 BCE. From the Metropolitan Museum of Art Egyptian collection. Accession number 15.3.1122. Creative Commons.

After the curtains were woven, they would need to be joined together. Additional resources would be needed to complete the task. In addition to fine linen sewing thread (much finer than that used for weaving), the Ancient Israelites would also need needles. Needles of the period were created in bone, copper, bronze, and stone. Some were very fine and others more broad, but sewing needles are some of the oldest textile implements created, with the oldest origination from the early Paleolithic age. (Figure 6.7) Thus, fine needles to join the various panels together would have been available and used to create the large 100 and 50 cubit long panels. One wonders if, like today, the Ancient Israelites lost or misplaced their needles? Perhaps, due to their preciousness, they found the perfect place to store them. One could not have easily run to the store to purchase a container of various sized needles. Each one was

[135] To put perspective on this, each panel is similar to the size of a double-sized bedsheet is 81" x 96" or 6 ¾ feet by 8 feet. A modern 250 thread count bedsheet (which most today would find coarse and uncomfortable) would require approximately 70,900 yards of thread for the warp of one sheet alone! Although there are a few finely woven Egyptian fabrics of this thread count and more, it would not be plausible on a ground loom in the desert.

handmade, which would have meant losing one would have delayed the sewing process by several hours if not a day or two.

FIGURE 6.7 Prehistoric bone needle dating to the late Bronze Age. Photograph by Kate Sumnall. Museum of London. Accession number 519538/LON-83A573. Creative Commons.

The Canopies of The *Mishkan*

Exodus 25:1-14

א וְאֶת־הַמִּשְׁכָּן תַּעֲשֶׂה עֶשֶׂר יְרִיעֹת שֵׁשׁ מָשְׁזָר וּתְכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי כְּרֻבִים
מַעֲשֵׂה חֹשֶׁב תַּעֲשֶׂה אֹתָם: ב אׇרֶךְ ׀ הַיְרִיעָה הָאַחַת שְׁמֹנֶה וְעֶשְׂרִים בָּאַמָּה וְרׇחַב
אַרְבַּע בָּאַמָּה הַיְרִיעָה הָאֶחָת מִדָּה אַחַת לְכׇל־הַיְרִיעֹת: ג חֲמֵשׁ הַיְרִיעֹת תִּהְיֶיןָ
חֻבָּרֹת אִשָּׁה אֶל־אֲחֹתָהּ וְחָמֵשׁ יְרִיעֹת חֻבְּרֹת אִשָּׁה אֶל־אֲחֹתָהּ: ד וְעָשִׂיתָ לֻלְאֹת
תְּכֵלֶת עַל שְׂפַת הַיְרִיעָה הָאֶחָת מִקָּצָה בַּחֹבָרֶת וְכֵן תַּעֲשֶׂה בִּשְׂפַת הַיְרִיעָה הַקִּיצוֹנָה
בַּמַּחְבֶּרֶת הַשֵּׁנִית: ד וְעָשִׂיתָ לֻלְאֹת תְּכֵלֶת עַל שְׂפַת הַיְרִיעָה הָאֶחָת מִקָּצָה בַּחֹבָרֶת
וְכֵן תַּעֲשֶׂה בִּשְׂפַת הַיְרִיעָה הַקִּיצוֹנָה בַּמַּחְבֶּרֶת הַשֵּׁנִית: ו וְעָשִׂיתָ חֲמִשִּׁים קַרְסֵי זָהָב
וְחִבַּרְתָּ אֶת־הַיְרִיעֹת אִשָּׁה אֶל־אֲחֹתָהּ בַּקְּרָסִים וְהָיָה הַמִּשְׁכָּן אֶחָד: פ ז וְעָשִׂיתָ
יְרִיעֹת עִזִּים לְאֹהֶל עַל־הַמִּשְׁכָּן עַשְׁתֵּי־עֶשְׂרֵה יְרִיעֹת תַּעֲשֶׂה אֹתָם: ח אׇרֶךְ ׀
הַיְרִיעָה הָאַחַת שְׁלֹשִׁים בָּאַמָּה וְרׇחַב אַרְבַּע בָּאַמָּה הַיְרִיעָה הָאֶחָת מִדָּה אַחַת
לְעַשְׁתֵּי עֶשְׂרֵה יְרִיעֹת: ט וְחִבַּרְתָּ אֶת־חֲמֵשׁ הַיְרִיעֹת לְבָד וְאֶת־שֵׁשׁ הַיְרִיעֹת לְבָד
וְכָפַלְתָּ אֶת־הַיְרִיעָה הַשִּׁשִּׁית אֶל־מוּל פְּנֵי הָאֹהֶל: י וְעָשִׂיתָ חֲמִשִּׁים לֻלְאֹת עַל שְׂפַת
הַיְרִיעָה הָאֶחָת הַקִּיצֹנָה בַּחֹבָרֶת וַחֲמִשִּׁים לֻלְאֹת עַל שְׂפַת הַיְרִיעָה הַחֹבֶרֶת הַשֵּׁנִית:
יא וְעָשִׂיתָ קַרְסֵי נְחֹשֶׁת חֲמִשִּׁים וְהֵבֵאתָ אֶת־הַקְּרָסִים בַּלֻּלָאֹת וְחִבַּרְתָּ אֶת־הָאֹהֶל
וְהָיָה אֶחָד: יב וְסֹרַחַ הֶעֹדֵף בִּירִיעֹת הָאֹהֶל חֲצִי הַיְרִיעָה הֶעֹדֶפֶת תִּסְרַח עַל אֲחֹרֵי
הַמִּשְׁכָּן: יג וְאַמָּה מִזֶּה וְאַמָּה מִזֶּה בָּעֹדֵף בְּאׇרֶךְ יְרִיעֹת הָאֹהֶל יִהְיֶה סָרוּחַ עַל־
צִדֵּי הַמִּשְׁכָּן מִזֶּה וּמִזֶּה לְכַסֹּתוֹ: יד וְעָשִׂיתָ מִכְסֶה לָאֹהֶל עֹרֹת אֵילִם מְאָדָּמִים וּמִכְסֵה
עֹרֹת תְּחָשִׁים מִלְמָעְלָה:

[1] For the *Mishkan* you shall make ten linen curtains [from] spun/twisted yarn of blue, purple and scarlet thread. You shall make them with artistic designs of cherubim. [2] The length of each curtain [shall be] twenty-eight cubits and the width [shall be] four cubits. The measurement for one curtain shall be the same for all the curtains. [3] Five curtains shall be joined, one to another and the five [other] curtains [shall be] joined, one to another. [4] And you shall make loops of blue [yarn from the] edge to the selvedge on one [set] of curtains and so too, you will make [blue yarn loops] on the outermost edge of the second set of curtains. [5] You shall make fifty loops on one curtain and fifty loops on the opposite edge of the second set [of curtains, so] that they may be clasped, one loop to the other. [6] And you shall make fifty gold clasps and join the curtains together with the clasps, so that the *Mishkan* shall be one.[7] You shall make curtains of goats' hair for the tent over the *Mishkan*; you shall make eleven curtains [in all.] [8] The length of each curtain

[shall be] thirty cubits and the width of each curtain [shall be] four cubits. The measurement for one curtain shall be the same for all eleven curtains. [9] And you shall join five curtains by themselves and six curtains by themselves. You shall fold the sixth curtain [and place it] at the front of the tent. [10] And you shall make fifty loops [from the] edge to the selvage on [one set] and fifty loops on the edge of the second set of curtains. [11] And you shall make fifty copper rings and join the rings to the loops and join the tent together and it will be one. [12] The remainder of the excess tent curtain (the half of the curtain which remains) shall hang over the back of the *Mishkan*. [13] And a cubit from this [side] and a cubit from that [side] which remains of the length of the tent curtains shall hang over the sides of the *Mishkan*, from this [side] to that [side] to cover it. [14] And you shall make a covering for the tent of ram skins dyed red and a covering of badger skins to lay above it.

The canopy of the *Mishkan* is made of four layers, each one distinctive. The top layer is some form of leather. Since the Hebrew word תַּחַשׁ is similar to a later Arabic word meaning dolphin, translators have confounded generations of B' Mitzvah students by translating "עֹרֹת תְּחָשִׁים" as dolphin skins. Others have translated it as badger or other skin from an animal long since extinct. Needless to say, the top layer is of some form of animal leather. Directly beneath that is a red leather canopy, which Homan remarked on in relation to the red leather tents of the *qubba*[136] (See Chapter 3.) Both these layers would offer the Ark of the Covenant and the other precious articles, such as the table and the menorah, protection from the elements. The next two layers, both woven, are imbued with both mystical power and symbolism.

[136] Homan, *To Your Tents, O Israel!*, 92-94.

The Goat's Hair Canopy

Wool is a very hearty material, used in many cultures not only for its warmth but also for its durability and ability to repel water.[137] Bedouin home tents, believed to be similar in shape to the *Mishkan,* are usually created either from sheep's wool or goats' hair. This layer, like the enclosure, being primarily utilitarian, would have been woven in a balanced or weft-faced tabby or plain weave. Fulling, a washing method that is akin to felting, would have increased the durability and waterproof quality of the fabric.[138] In addition, the quality of the cloth might have been coarser than that of the enclosure, with a warp density of 20-50 ends per inch, which would have created a cloth that would have been durable, but not too heavy to fold and transport.[139] Many drawings and accounts describe it as a black tent, which may suggest the later Bedouin home tents rather than an ancient reality. From Egyptian tomb paintings, we know that Egyptian goats varied in color, from solid to piebald.[140] Therefore, when imagining the tent, it could have been any color: brown, rust, black, white, or even variegated. The text does not give exact colors; however, it does provide the exact measurements and sewing instructions.

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[137] During World War II, due to rubber shortages, wool diaper covers were put back into service after they had gone out of vogue. Patterns for wool diapers appeared frequently in women's magazines of the 19th century and before.

[138] Degen, "Ground Loom Weaving Among Negev Bedouin Women, 3–32.

[139] Rosen and Saidel state in their article "The Camel and the Tent: An Exploration of Technological Change Among Early Pastoralists" that an average single family Bedouin tent (12 x 4 m) weighs approximately 400-500 kg or 881 to 1102 lbs. The goats' hair layer is approximately the same size as 5-6 of these average Bedouin tents. By using these calculations, the total weight of the completed goats' hair layer would be between 4,000 – 7,000 lbs.

[140] Douglas Brewer, essay, in *A History of the Animal World in the Ancient near East* (Leiden, The Netherlands: Brill, 2002), 425–56, 440.

Instructions for the goats' hair layer begin in Exodus 26:7, charging the Israelites with creating eleven curtains or panels. Each panel should be 30 cubits long (45 ft/13.72 m) by four cubits wide (6 ft/1.83 m). The panels were then joined together, five in one group and six in the other. (Figure 6.8) Each joined using the needles of the period and, one would assume, a wool-based thread as there are other instances in the archeological record of wool fabrics being joined together with wool thread. As the resulting canopy was a ritual object, like the lower panel and the priestly garments, the prohibition against the mixing of linen and wool[141] may not have been enforced in this case.[142] In either situation, a whipping stitch commonly used in Egypt to create seams, would have been employed to create a seam with whichever type of thread, linen or wool, that would have been allowed.[143]

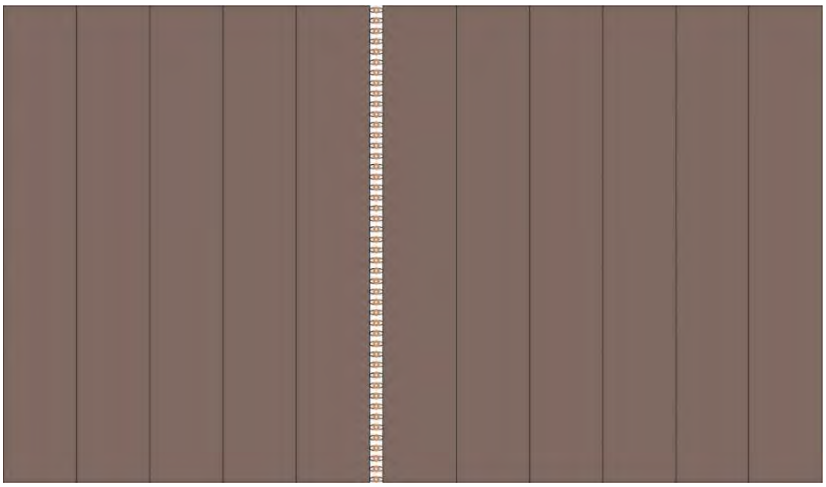

FIGURE 6.8 – Drawing of the layout of the Goats' Hair layer. The black lines are the panel seams, and the middle orange are the loops with their copper clasps. Drawing by the author.

[141] There are two places in the Torah that prohibit the mixing of fabrics. The first is found in Leviticus 19:19 "You shall not put on cloth from a mixture of two kinds of material" and the second in Deuteronomy 22:9-1 "You shall not wear cloth combining wool and linen." I suggest Orit Shamir's chapter "The High Priest's garments of mixed wool and linen (sha'atnez) compared to archaeological textiles found in the Land of Israel" found in the book *Textiles and Cult in Ancient Mediterranean* by Oxbow Books, for a detailed historical and archeological view of this subject.
[142] Orit Shamir, "Two Special Traditions in Jewish Garments and the Rarity of Mixing Wool and Linen Threads in the Land of Israel," *Prehistoric, Ancient Near Eastern & Aegean Textiles and Dress*, September 30, 2014, 297–308, https://doi.org/10.2307/j.ctvh1drkt.17, 299.
[143] Barber, *Prehistoric Textiles*, 165.

Fifty loops were created on the edge of each of the large, joined panels and fastened together with fifty copper claps. Depending on the length of the loops and the size of the clasp, this removable seam could have been very tight or a bit loose. Since the loops are described as being added after the weaving of the panels, one can assume that they were not created during the weaving process itself, by creating a loop on the turn of the weft or by laying in a supplementary weft, which was common in Egyptian weaving.[144] Hence the weaver would need to sew a length of yarn to create each loop. When clasped together the canopy would measure approximately 30 cubits wide by 44 cubits long (45 ft x 66 ft/ 20.1m x 13.7m) and then be draped over the wooden frame. On the north, south, and west sides, it would reach the ground and on the east side, the sixth panel drapes over the front creating a sheltered entryway. (Figure 6.9)

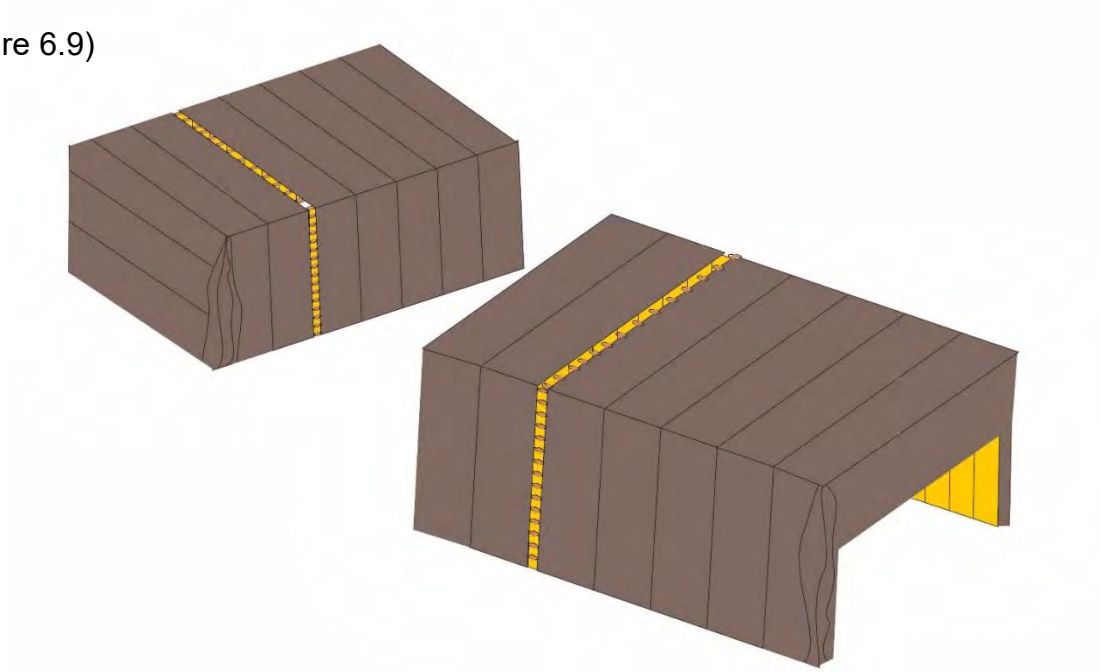

FIGURE 6.9 – The goats' hair layer over the frame of the *Mishkan* with the sheltered entryway on the east side. The black lines are panel seams, and the gold is the looped seam with its copper claps. Drawing by the author.

[144] Barber, *Prehistoric Textiles,* 152.

By utilizing the calculations given in the Ur III administrative texts, we again try to ascertain the needs and time involved in creating the goats' hair layer.[145] Assuming a warp of 30 ends per inch and a weft of approximately 40 ends per inch (which creates a balanced weft-faced weave) with some fulling or washing at the end, one would need to wind a warp approximately 6 1/2 feet wide 47 feet long for each panel.[146] Using these calculations, the Israelites would need approximately 485,980 yds or 276.125 miles[147] of yarn to weave the entire canopy, or around 44,180 yds per panel. With a coarser width yarn, one can apply the upper measurement of weaving per day. Therefore, a three-weaver team would be able to weave 20-25 inches per day completing a panel in 22 ½ days. Consequently, to complete the canopy in the allotted time (between 70 and 90 days) it would require five, three-weaver teams 67 days to complete the eleven panels, allowing for the extra time to warp each loom, multiple times. There are no records regarding the length of warp a weaver could manage on the back beam. In the author's personal experience, a warp longer than 47 feet would become unmanageable, and the quality of the cloth would suffer. So, each loom would need to be warped again after the completion of each panel, adding (based on the Ur III administrative texts) three or four extra days per panel.

[145] Firth and Nosch, *Spinning and Weaving Wool in Ur III Administrative Texts.*
[146] Although there are a few finely woven Egyptian fabrics of 100 ends per inch and finer, fabrics of this thread count and more, based on my experience, would have been difficult if not impossible on a ground loom in the desert.
[147] To put this in perspective it is 286 miles from Washington D.C. to Bridgeport CT on I95.

The First Layer – Cherubim

The bottom layer is the interior roof or ceiling of the *Mishkan*. Unlike the others, this layer is specifically described in Exodus 25:1 as *sha'atnez*, a mixed textile of both wool and linen. Not only the textiles of the *Mishkan* structure, but those which are worn by the priests are made of this mixed source cloth. It may be that textiles of this type are reserved only for the use of YHVH and God's direct servants or perhaps, that textiles made of wool and linen provide a protective layer against the power and majesty of YHVH's light and presence. In either case, this layer was different, involving more complicated weaving skills and techniques.

The text itself is ambiguous regarding the exact method of how the mixture was created. Rashi states in his commentary on Exodus 26:1 that the yarn itself is a mixture; a four-strand yarn, each with a strand of blue, purple and red and white linen yarn. This four-strand yarn is then made by plying the four six-ply yarns. It was painfully clear that Rashi knew nothing about spinning, as such a yarn would be incredibly thick and unwieldy to use and would create a cloth that was extremely heavy[148] and thick, similar to a cord or rope (Figure 6.10). Rashi also had opinions on the weaving style, explaining in the same commentary that the design "was woven directly in – not embroidered on it afterward with a needle, but woven on both sides, one design on one side and another on the other side."[149] This implies double-weaving, a process of weaving two layers of

[148] As stated before, in relation to the goats' hair tent The weight of the yarn used for these tents is much smaller than what Rashi is suggesting. Using this thinner yarn, the weight of the complete goats' hair layer would be between 4,000 – 7,000 lbs. Therefore, if Rashi's idea of a 24-strand yarn was correct, the tent might weigh somewhere in the 10,000 lb range, which one would assume would be completely unmanageable to ancient peoples.

[149] Michael Carasik, *The Commentators' Bible: The JPS Miqra'ot Gedolot: Exodus* (Philadelphia PA: The Jewish Publication Society, 2005), 228.

cloth at the same time which allows the weaver to create a two-sided fabric. (Figure 6.11) Of course, Rashi is writing his commentary almost 2,000 years after the date for the Exodus, so his commentary is based more on

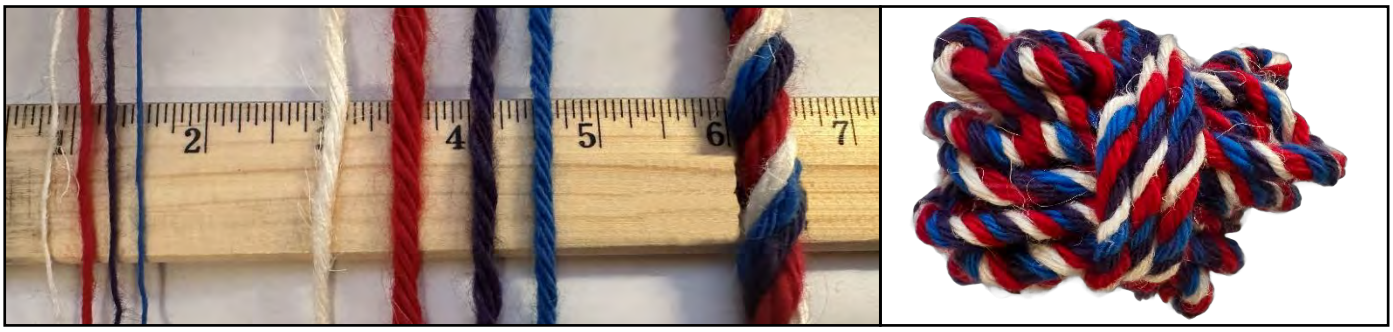

FIGURE 6.10 – Rashi yarn spun by the author. Left, Singles at 24-26 wpi. Middle, Six-ply yarn at 6-7 wpi, Right, 24-ply yarn at 3 wpi. Far right, small ball of 24-ply yarn. Linen spun using flax roving, wool yarns spun using pre-dyed merino wool.

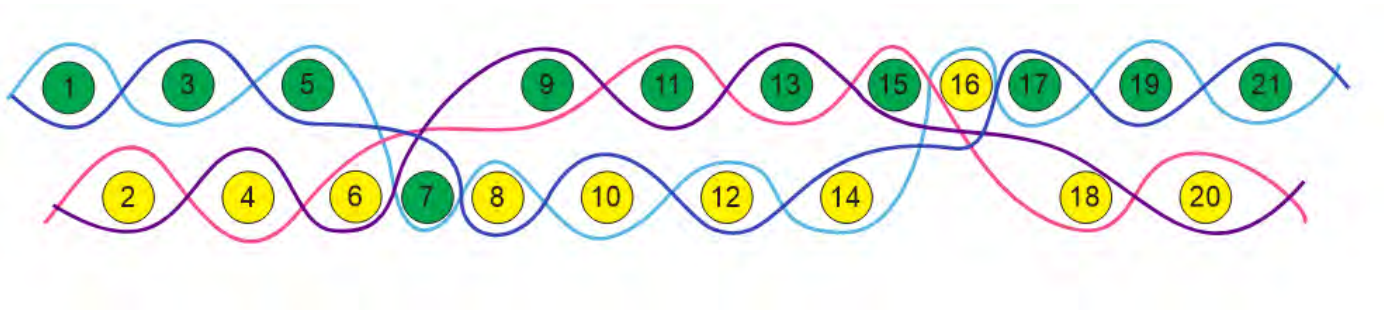

FIGURE 6.11 – Author's drawing of the interplay between the warp and weft in double-weave cloth. The green dots represent the top layer warp strings, and the yellow dots represent the bottom layer.

his worldview than on actual historical facts or documentation. For example, the earliest example of double-weave patterning is dated 700 CE from Peru. It did not enter European weaving circles until the 11th century, placing it squarely in Rashi's time.[150] Although this would be an excellent way in which to create the pattern of the cherubs on

[150] Nellie Sargent Johnson, "Historical Background of Double Woven Cloth," *Supplement to the Handicrafter* 5, no. 4 (n.d.): 1–6, 1.

the inner layer of the *Mishkan*, it would be impossible to imagine that the weavers of the Bronze Age knew such a technique.

Exodus 26:1 states "כְּרֻבִים מַעֲשֵׂה חֹשֵׁב תַּעֲשֶׂה אֹתָם", often translated as "designs of cherubim shall be worked into them." The phrase in Hebrew is difficult since the root of most of the words is "עָשָׂה", which in general means "to do" or "to make". Many commentators focus on the word "חֹשֵׁב", which comes from the word to "think or plan" and forms the Hebrew root for the word "to weave."[151] According to commentators like Ibn Ezra, this was "calculated work,"[152] which is designed mentally and then afterward drawn out for the weaver. Once again, similarly to Rashi, Ibn Ezra is writing more than 2,000 years after the Bronze Age date of the Exodus and he too, is describing techniques common in his time. He even states that it should be created like one weaves silk.[153] Silk weaving in his time was a brocade technique, akin to tapestry, where a design is created by laying supplemental weft yarns (often a larger size than the warp) against a plain-weave ground.[154] Although Exodus itself doesn't hint at the type of weaving style used, it does give us a design, the cherubim, and suggests that they should be made of all four yarns: linen and blue, red, and purple goats' hair. Many have suggested that, similarly to Rashi, the colors were combined into one yarn and the cherubim designs were then woven with the variegated yarn. (Figure 6.12) This would be the easiest way to create the pattern, only using two contrasting colors. Currently

[151] Carasik, *The Commentator's Bible*, 228.
[152] Ibid.
[153] Ibid.
[154] Azalea Stuart Thorpe, Jack Lenor Larsen, and Mary Lyon, *Elements of Weaving: A Complete Introduction to the Art and Techniques* (Garden City, N.Y: Doubleday, 1978), 126-135.

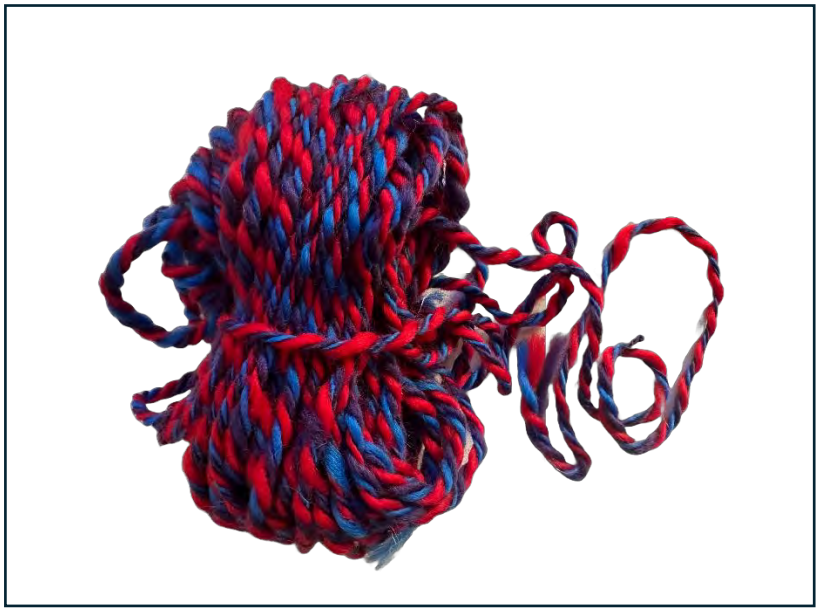

Figure 6.12 – Author's spun variegated yarn.

there is no archeological or textual evidence for multicolored or variegated yarn. There are, however, numerous descriptions of the creation and use of multicolored textiles chiefly created for the royalty, the wealthy, and the Gods.[155]

Nonetheless, iconography supports the theory of a vast array of multi-colored woven fabrics in Egypt and the surrounding cultures which can be found in tomb paintings that depict people from other cultures wearing striped or other variegated fabrics. An example of this is the Aamu, thought to be from the Levant, who are depicted in the tomb of Beni Hasan.(Figure 6.13)[156] Texts also support the notion that multicolored textiles were well-known in the Levant and Egypt with most having come from Ebla and Mari in modern-day Syria, where administrative texts confirm their

[155] Rita P. Wright, "Sumerian and Akkadian Industries: Crafting Textiles," essay, in *The Sumerian World* (New York, NY: Routledge, 2013), 395–417, 401.
[156] Janice Kamrin, "The Aamu of Shu in the Tomb of Khnumhotep II at Beni Hassan," *Journal of Ancient Egyptian Interconnections* 1, no. 3 (September 16, 2010), https://doi.org/10.2458/azu_jaei_v01i3_kamrin, 24-25.

appearance as early as the 24th century BCE.[157] The technique may then have spread to Egypt through Syrian captives around the 15th century BCE during the reign of Thutmose III.[158] In particular, the *mardatum,* a multi-colored textile often with figural designs that were woven by the Mari as covers for furniture, such as thrones, wall-hangings and floor coverings. To further link the *mardatum* to the cherubim cloth of the *Mishkan*, in the administrative texts found at Nuzi, there is a description of a heavy cloth made of wool with an appliqued *mardatum* tapestry, with silver fasteners that formed a larger composite object.[159]

FIGURE 6.13– The Aamu from Tomb no. 3 of Beni Hasan, wearing various patterned fabrics. Plate XXXI from Newberry and Fraser's book *Beni Hasan* vol 1. (1893).

[157] Marie-Louise Nosch and Cecile Michel, *Textile Terminologies: In the Ancient Near East and Mediterranean from the Third to the First Millennnia BC* (Oxford, Oakville: Oxbow Books, Limited Casemate Academic distributor, 2013), 154.
[158] Joanna S. Smith, "Tapestries in the Bronze and Early Iron Ages of the Ancient Near East," *Textile Production and Consumption in the Ancient Near East*, January 11, 2013, 161–88, https://doi.org/10.2307/j.ctvh1dvx0.13, 163.
[159] Ibid, 169.

Although there are no surviving examples of *mardatum*, there are a few surviving examples of Egyptian tapestry weaving. The most compelling examples in relation to the *Mishkan* are the tapestry fragments circa 14th century BCE found in the tomb of King Thutmose IV, discovered by famed Egyptologist Howard Carter (or more precisely, by his puppy).[160] One piece in particular, a tapestry-woven cartouche of Thutmose IV's father Amenhotep II, surrounded by a field of lotus flowers, is a magnificent example of technique and design. (Figure 6.14) W.G. Thomson in his description of the textile in Howard Carters book, *The Tomb of Thoutmo͂sis IV*, states that the linen ground of the

FIGURE 6.14 – Image of a tapestry fragment with the cartouche of Amenothep II. Plate 1 from Howard Carter's book *The Tomb of Thoutmo͂sis IV*. (1904).

[160] Rosalind M. Janssen, "The 'Ceremonial Garments' of Tuthmosis IV Reconsidered," *Studien Zur Altägyptischen Kultur*, 1992, 19 (n.d.): 217–24.

tapestry is very fine, with about 60 warps strings to the inch. “The weft is appreciably thicker than the warp, and the delicacy with which floral and other forms are rendered leaves no doubt that an upright loom was used.”[161] Elizabeth Barber elaborates on Thomson’s description by explaining that the weaver used two different tapestry techniques: slit tapestry and dovetailed tapestry.[162] Slit tapestry is so named because of the small space that is created when two colors run parallel to each other in the same weft. When the color is fed back in the opposite direction, it creates a small slit or hole. (Figure 6.15 and 6.16) In many cases, if the slit is significant in size, the weaver will return and sew the edges together, thereby strengthening the fabric and repairing the hole. In dovetailing, the weft of both colors are wrapped around a single warp thread which prevents a hole, but in its place, it creates a fine zigzag that is visible and can mar the overall woven image. (Figure 6.15 and 6:17)

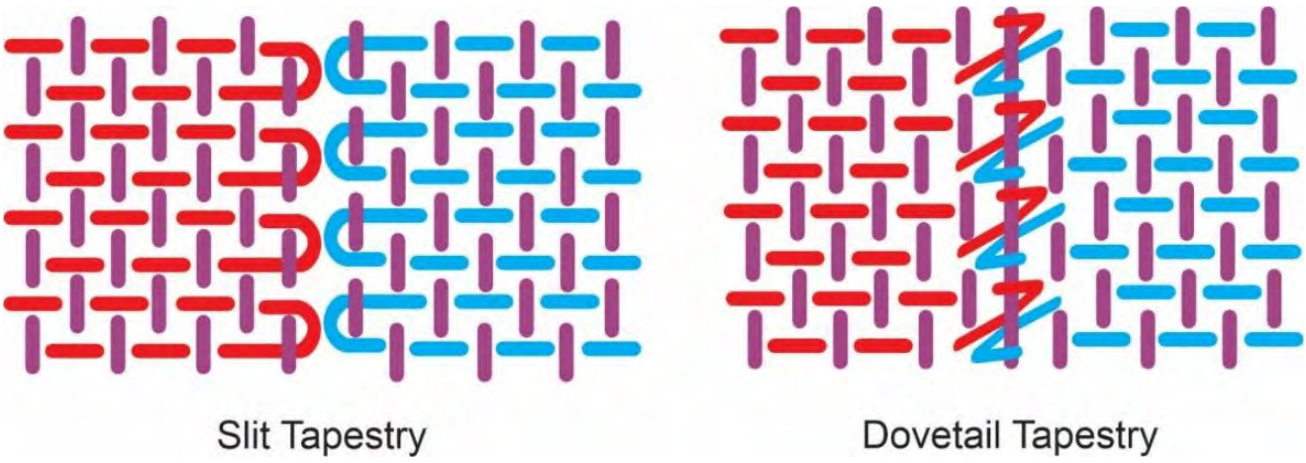

FIGURE 6.15 – Illustration by the Author of Slit and Dovetail tapestry techniques.

[161] Howard Carter et al., *The Tomb of Thoutmo͂sis IV, by Howard Carter and Percy E. Newberry; with an Essay on the King’s Life and Monuments by Gaston Maspero ... and a Paper on the Physical Characters of the Mummy of Thoutmo͂sis IV, by G. Elliot Smith .* (Westminster: A. Constable and Co, 1904), 143.
[162] Barber, *Prehistoric Textiles*, 157.

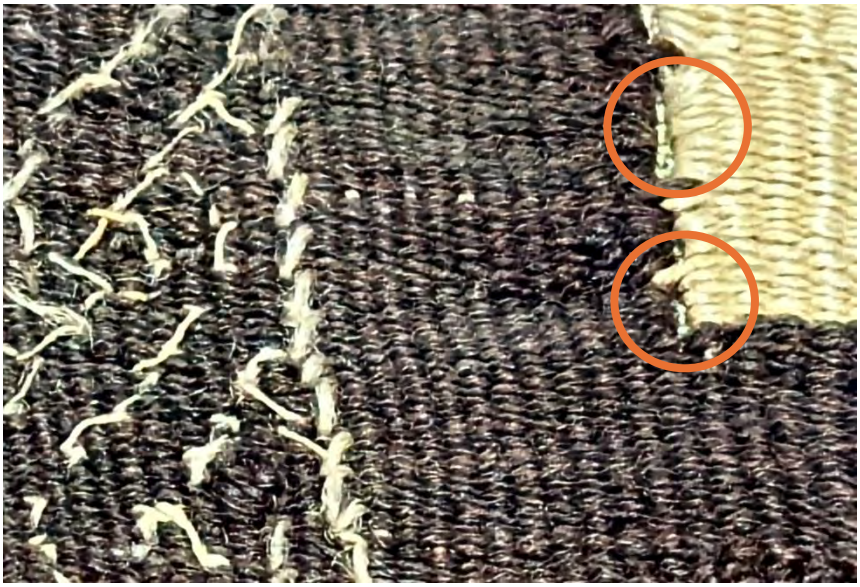

FIGURE 6.16 – Slit tapestry technique on the border of a Coptic Christian textile from the 5th or 6th century CE. The small holes which are created are circled in orange. Located in the Costen Textile Collection of The George Washington University Textile Museum. Accession number T-0405. (Photograph from the Author's collection).

FIGURE 6.17 – Tapestry sample woven by the Author. The area in the circle shows the visible zigzag created by the dovetail tapestry technique. (Photo from the Author's collection.) (2024).

The cartouche of Amenothep II is not the only textile fragment of interest found in King Thutmose IV's tomb. Another fragment, almost bleached white from exposure and age, displays another weaving technique akin to tapestry, this one much older, where

the yarns are inlaid during the weaving process. These yarns lay on top of the ground fabric. In Figure 6.18, small, originally pink rosettes alternate with green rosettes with pink centers. The ground cloth is tightly woven weft-faced fabric. To achieve this, the

FIGURE 6.18 – Thutomsis IV inlay fabric found by Howard Carter. Plate XXVIII from Howard Carter's book *The Tomb of Thoutmosis IV.* (1904).

weaver throws the shuttle with the ground weft and beats. Using a sharp tool, the weaver picks up the warp threads where the pattern will be and lays a supplementary weft (or warp) in place on top of the weft. If the supplementary warp is a thicker yarn

than the ground warp, it will cover the warp. In this way, a design can be created without extra loops and strings crossing in the back of the fabric. This technique is very similar to brocade.[163]

A fourth patterning technique that was prevalent during the Bronze Age is called "warp-pickup," similar to what weavers use to make small bands and belts today. (Figure 6.19) The extra warp strings float on the back until pulled forward. If a weaver is

FIGURE 6.19 – Author's woven back-strap loom belt. Warp-faced/warp-pickup method. (Photo from the Author's collection.) (2024).

using very few colors in regular intervals, this technique makes a clean geometric pattern as can be seen in Figure 6.20. This large warp-faced textile was found by Howard Carter in an unknown 18th Dynasty tomb in Thebes and is now housed in the Victoria and Albert Museum's collection in London.

[163] Barber, *Prehistoric Textiles*, 159.

FIGURE 6.20 – Warp-faced textile found in Thebes. From the Victoria and Albert Museum, London. Accession number T.251-1921. Fair use image.

All these techniques could have been used to create the inner layer of the *Mishkan*. Based on my study of the text and the archeological record, I believe that a combination of brocade and/or tapestry was used to weave the inner layer. A fine linen ground warp composed the background, perhaps woven at 50 ends per inch, with the colored wool yarn woven in the pattern of the cherubim. If I were to make these panels today, I would use the three-ply variegated yarn on a linen ground. (Figure 6.12) However, I do not believe that the Ancient Israelites would have made that choice. Perhaps the images of the cherubim were woven in an alternating pattern similar to the lotus flowers on the Thutmosis IV fragments, or as one large image on each panel. There is a strong possibility that they were woven on vertical two-beam looms, by at least three or four people. The amount of cloth woven in a day would be quite low, as

both tapestry and brocade techniques are time consuming. Most of the highly skilled weavers would be tasked with creating these panels. As these would be one-sided textiles, they would be placed faced down creating a patterned ceiling for the *Mishkan* similar to the funeral palls described in Chapter 3.

Like the goats' hair layer, the cherubim layer is made of multiple panels that are joined together. Here, ten panels, each measuring 28 cubits long (42 feet / 12.8m) by 4 cubits wide (6 feet / 1.8m). Five panels would be sewn together, probably with a whipped stitch, and similarly to the goats' hair layer, fifty loops were made. For this layer, the loops were to be made of *tekhlet,* or blue dyed yarn, and the corresponding clasps were made of gold. (Figure 6.21) When joined the layer, it would be 42 x 60 feet which would allow for the layer to hang down approximately seven feet on the north, south, and west sides. There was no drape on the east side.

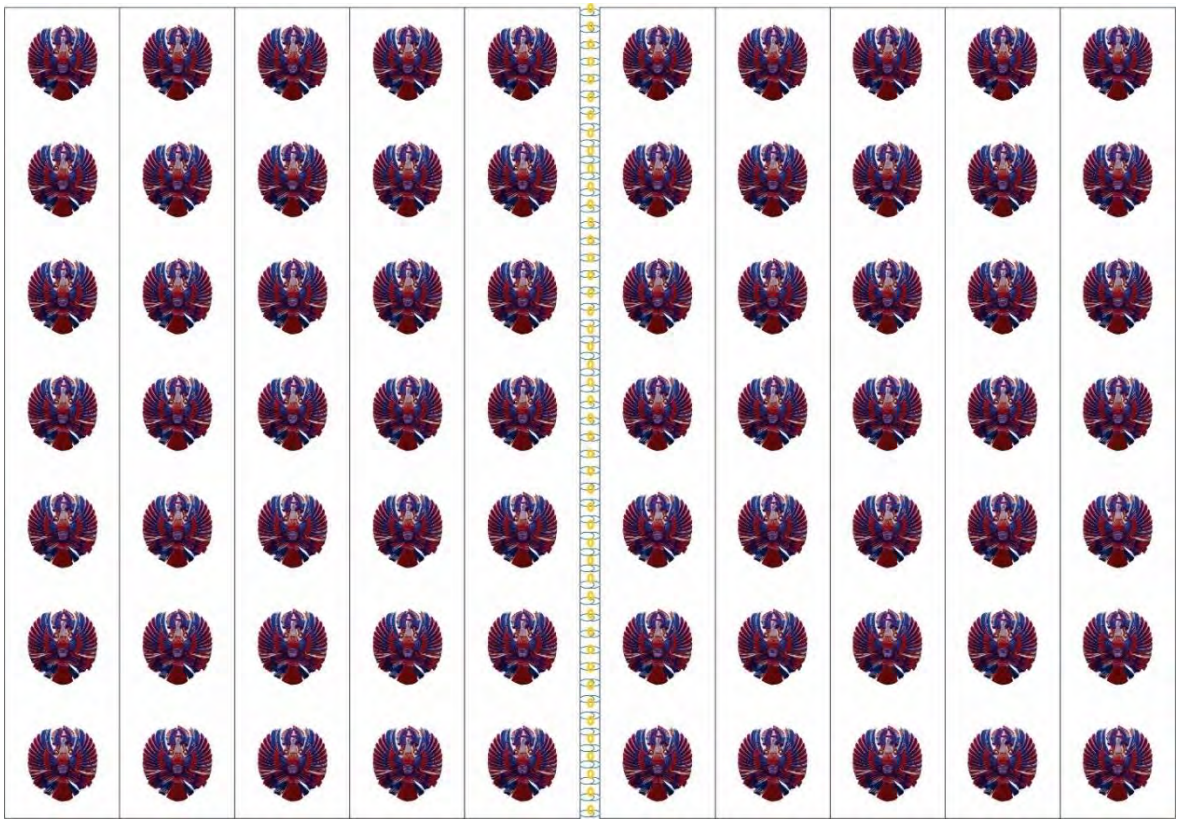

FIGURE 6.21 – Author's rendering of the interior side of the cherubim layer. The light gray lines are the panel seams. The blue and yellow center seam depicts the blue loops and the golden clasps.

As stated above, because the weaving technique for creating the cherubim is unknown, it would be difficult to give a timing for the weaving of these panels. Nevertheless, by using the lowest amount given in the Ur III administrative texts as a guide, we may be able to ascertain the approximate time involved in weaving each panel. Unlike the goats' hair, this panel may be finished or laundered after weaving, but the goal would not be to full or felt the fabric as the shrinkage levels between the linen and the wool would create puckers and other undesired results and therefore we will base our calculations on a non-fulled fabric with a common allotment for take-up. The loom (either a ground loom or a vertical two-beam loom) would be warped with approximately 47 feet of yarn. If three weavers were able to weave between eight and

ten inches per day, with the addition of five days for warping, it would have taken them approximately 75 days to complete one panel. This type of weaving is time consuming and not something that the untrained or apprentice weavers would have been able to do quickly or proficiently. If we apply the time constraint imposed by *Midrash*, they would have needed at least ten groups of three weavers each to weave the inner cherubim layer in time.

After the panels were completed, assembled, and installed only Moses and the High Priest would have seen these panels which must have been truly magnificent to behold. It is important to note however, that those weaving these amazing fabrics would have seen them during the creation process as they slowly grew, inch by inch. One can only image how exciting it must have been not only to create such a fabric, but to experience it in its minute detail which is something not even Moses or the High Priest would ever do.

The Entryway Screens

Exodus 26:31- 37

לא וְעָשִׂיתָ פָּרֹכֶת תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ מָשְׁזָר מַעֲשֵׂה חֹשֵׁב יַעֲשֶׂה
אֹתָהּ כְּרֻבִים: לב וְנָתַתָּה אֹתָהּ עַל־אַרְבָּעָה עַמּוּדֵי שִׁטִּים מְצֻפִּים זָהָב וָוֵיהֶם
זָהָב עַל־אַרְבָּעָה אַדְנֵי־כָסֶף: לג וְנָתַתָּה אֶת־הַפָּרֹכֶת תַּחַת הַקְּרָסִים וְהֵבֵאתָ
שָּׁמָּה מִבֵּית לַפָּרֹכֶת אֶת אֲרוֹן הָעֵדֻת וְהִבְדִּילָה הַפָּרֹכֶת לָכֶם בֵּין הַקֹּדֶשׁ וּבֵין
קֹדֶשׁ הַקָּדָשִׁים: לד וְנָתַתָּ אֶת־הַכַּפֹּרֶת עַל אֲרוֹן הָעֵדֻת בְּקֹדֶשׁ הַקָּדָשִׁים:
לה וְשַׂמְתָּ אֶת־הַשֻּׁלְחָן מִחוּץ לַפָּרֹכֶת וְאֶת־הַמְּנֹרָה נֹכַח הַשֻּׁלְחָן עַל צֶלַע
הַמִּשְׁכָּן תֵּימָנָה וְהַשֻּׁלְחָן תִּתֵּן עַל־צֶלַע צָפוֹן: לו וְעָשִׂיתָ מָסָךְ לְפֶתַח הָאֹהֶל
תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ מָשְׁזָר מַעֲשֵׂה רֹקֵם: לז וְעָשִׂיתָ לַמָּסָךְ חֲמִשָּׁה
עַמּוּדֵי שִׁטִּים וְצִפִּיתָ אֹתָם זָהָב וָוֵיהֶם זָהָב וְיָצַקְתָּ לָהֶם חֲמִשָּׁה אַדְנֵי נְחֹשֶׁת: ס

[31] And you shall make a *parochet* [curtain] of blue, purple, and red yarn and fine twisted linen yarn. You shall make them with artistic designs of cherubim. [32] And you shall place it [the *parochet*] upon four pillars of acacia wood overlaid in gold and their hooks of gold upon the four silver sockets. [33] And you shall place the *parochet* under the clasps and you shall bring there from the house behind the *parochet* the Ark of the Testimony and the *parochet* will be a separation between the holy [place] and the Holy of Holies. [34] And you shall place the *parochet* upon the Ark of the Testimony in the Holy of Holies. [35] And you shall put the table outside the *parochet* and the *menorah* across from the table on the south side of the *Mishkan* and the table you shall put upon the north side. [36] And you shall make a [woven] screen for the opening of the tent of blue, purple, and red yarns and fine linen yarn made by a weaver. [37] And you shall make for the screen, five pillars of acacia wood and overlay them in gold and their hooks of gold and you shall cast for them fine sockets of copper.

Besides the textiles needed for the canopy and the enclosure, three entryway screens were also needed: one which divided the *Mishkan* into two rooms (the main room and the Holy of Holies), the entryway screen into the *Mishkan*, and the entryway screen into the enclosure. All three were to be *sha'atnez*, but the weaving styles were quite different.

The enclosure entryway screen of twenty cubits (30 ft. / 9.1m) was to be hung from four posts with four sockets and a similar entryway screen was to be created for the entrance to the *Mishkan*, however it was to be hung from five posts overlayed with gold. Both screens, unlike the cherubim layer, were to be done in "מַעֲשֵׂה רֹקֵם" or "variegated woven work," not " מַעֲשֵׂה חֹשֵׁב" or "thoughtful work."[164] Some have suggested that this is a woven work of many colors, perhaps variegated stripes on a warp of linen, similar to the Joseph Coat or Rainbow style tallitot that are common today. (Figure 6.22)

FIGURE 6.22 – Rabbi Brant Rosen leading a service on August 19, 2009 wearing a Joseph Coat tallit. Creative Commons Universal Public Domain Dedication media.

The final woven component of the *Mishkan* is the interior screen or "פָּרֹכֶת" (*parochet)*. This was the divider between the main room of the *Mishkan* and the Holy of Holies, where the Ark was kept. The word *parochet* may be derived from the root

[164] Elizabeth Barber explains in her article "New Kingdom Egyptian Textiles: Embroidery vs. Weaving" in the *American Journal of Archaeology* 86, no. 3 that some translate this as embroidery, but the Egyptian record, both textual and archeological show little evidence of embroidery and, after closer inspection by textile experts, they were found to have been the work of weavers.

meaning to “bar the way.”[165] This would be one of the most important textiles of the *Mishkan* as it would guard and mark the entrance to the Holy of Holies. Only Moses and the High Priest would even draw near to it. It is, in essence, YHVH’s bedroom door and it requires a fabric of unbelievable beauty. In common parlance, the word *parochet* refers to a curtain found in many synagogues to screen the Torahs, either as the front of the ark or within the ark itself. Here, like the cherubim layer, the Israelites are told to work cherubim into the panel which, based on the size of the inner chamber, should be 30 feet wide by 15 feet tall. Like the other screens, it will hang upon four posts, overlaid with gold, and shall have hooks of gold and sockets of silver. Since the weaving technique is described as, “מַעֲשֵׂה חֹשֵׁב” then it would match the inner cherubim layer of the canopy and would take a similar time to craft.

I like to think that the interior screen would be woven in a technique like the Coptic wall hanging in Figure 6.23. Several sections of this animal, including the tail show the laid-in tapestry technique which may be one of the techniques used to create the cherubim on both the inner layer and the interior screen. (Figure 6.24) In addition, like both textiles, this animal is made of wool, in-laid on a linen ground. On closer examination, the linen ground has a warp of approximately 45 ends per inch which is similar to our target of 50 ends per inch for the inner layer. Although from a much later period, it has a feeling of movement and life that I imagine the inner layer and the interior screen would have displayed.

[165] Sarna, *The JPS Torah: Exodus*, 171.

FIGURE 6.23 – Coptic wall hanging from the 2nd – 4th century CE. Wool inlaid on a linen ground. . Located in the Costen Textile Collection of The George Washington University Textile Museum. Accession number T-0543b. (Photograph from the Author's collection).

FIGURE 6.24 – Close-up of an animal's tail from a Coptic wall hanging from the 2nd – 4th century CE. Wool inlaid on a linen ground. Located in the Costen Textile Collection of The George Washington University Textile Museum. Accession number T-0543b. (Photograph from the Author's collection).

Chapter 7

THE SPINNERS AND WEAVERS

The Spinners

Although we have hinted at the gender of our weavers and spinners throughout this thesis, we have not fully examined the role that women played in the creation of the *Mishkan*. Throughout the entire *Mishkan* texts, only two lines specifically refer to the work of women:

Exodus 35:25-26

כה וְכָל־אִשָּׁה חַכְמַת־לֵב בְּיָדֶיהָ טָווּ וַיָּבִיאוּ מַטְוֶה אֶת־הַתְּכֵלֶת וְאֶת־הָאַרְגָּמָן אֶת־
תּוֹלַעַת הַשָּׁנִי וְאֶת־הַשֵּׁשׁ: כו וְכָל־הַנָּשִׁים אֲשֶׁר נָשָׂא לִבָּן אֹתָנָה בְּחָכְמָה טָווּ אֶת־
הָעִזִּים:

[25]And all wise-hearted women who spun with their own hands and came with their yarns of blue, purple and scarlet red and fine-spun linen. [26]And all the women that are excelled in their hearts together with wisdom spun the goats' hair.

Nevertheless, based on archeological and textual sources, we can assume that women played an integral part in the entire process of creating the textiles for the *Mishkan* as women have been weavers and spinners from the beginning.

When archeologists excavate home sites, they usually find large numbers of whorls and other spinning implements.[166] This evidence proves that women were spinning while conducting everyday tasks, such as walking, cooking, taking care of the children and managing the household. As we have seen, it takes an enormous amount of yarn to create even the coarsest fabric. So, women would need to be continually

[166] Carolyn Graves-Brown, *Dancing for Hathor: Women in Ancient Egypt* (New York: Bloomsbury, 2013), 74.

spinning throughout the day. A drop spindle is an incredibly easy tool to lay down for a moment and take up again, continuing where you left off. Perhaps it was an activity that the whole household would share in, with children helping to card and prepare the fibers, women spinning yarn, and men spinning cording for twine and rope. The ancient world, like our modern world, relied on yarn, twine, and rope for clothing, furniture, and animal and farm tasks.[167]

In the previous chapters, the assumption was made that all the yarn may have been provided from the "borrowed" goods of the Egyptians. Thus far, we did not take into account the verse above, which states that the women with skill spun the yarn. Here Rashi weighed in again in his commentary on Exodus 35:25 where he states that these women were so skilled that they spun the goats' hair directly from the back of living goats. This practice would have been problematic for many reason, not including that the hair would be filled with coarse outer hairs, vegetable debris, and dirt which would make a very messy and unsatisfactory yarn. Rashi may have been quoting the Sages who also make this assertion in Shabbat 99a where they taught in a *bariata* that the goats were rinsed first and then the women spun directly from them. I recently spoke to a sheep farmer and avid spinner who said that although during the molting season it would be possible to spin directly from the animal, she had never tried or even heard of it. She also stated that each animal's molting time is a bit different which means that one could not guarantee that an animal would be at its prime time when the

[167] Elizabeth J.W. Barber, "Weaving the Social Fabric," essay, in *Ancient Textiles* (Oxford, UK: Oxbrow, 2014), 173–78, 174.

spinning was required. For this reason, I do not believe that the Israelite women spun directly from the goats' backs as Rashi and the Sages suggest.

Researchers have long attempted to ascertain the abilities of ancient spinners. For their article "Spinning and Weaving Wool in Ur III Administrative Texts," Richard Firth and Marie-Louise Nosch assembled a team of spinners and weavers at the Centre for Textile Research in Copenhagen. Based on administrative texts and their research, a skilled spinner would have been able to spin approximately 247 yards (226 meters) of wool yarn per day. Of course, this was after the 32 days it required to clean, mingle, and prepare the wool. Based on these numbers, for the goats' hair canopy it would take almost 5 ½ years for one woman to spin enough yarn required.[168] One can imagine, that if the *Mishkan* required a great deal of yarn processing to be done at the foot of Mount Sinai, every person who had knowledge of spinning would be spinning as much as they could in a day. Thus, one can surmise that the Torah may name only the women, but in this situation men, women, and children of all ages might be engaged in spinning. Perhaps this is one of those moments in the Torah where women are given some agency and respect, similar to the daughters of Zelophehad, whose story is told in Numbers 27:1-11. Or it may be a moment of inclusivity, like Parashat Va-Yakhel (Exodus 35), where the entire community is invited to participate. In either case, the writers of the Torah wanted us to know that women were involved in the creation of the *Mishkan.*

[168] Firth and Nosch, "Spinning and Weaving Wool in Ur III Administrative Texts."

The Weavers

"And Miriam was a weaver of unique variety.
The tapestry she wove was one which sang our history."
-from *Miriam's Song* by Debbie Friedman

Early weaving appears to have been a gendered task throughout much of the world, with women taking the lead.[169] There are many records that describe the primary weavers as women. Once again, weaving is an easy trade to do while managing a household. Social class does not seem to matter in relation to weaving, as we see elite women running full households in addition to small weaving workshops. This is evident in the accounts of the Old Kingdom period in Ancient Egypt, where we have records of women managers of various social classes in charge of large textile workshops.[170] This is also apparent in the famous tomb painting from the Tomb of Khnumhotep, where an older women is managing a group of women who are preparing fiber, spinning and weaving.(Figure 7.1) Ground looms were especially accommodating to the working housewife in the Near East, since there is very little rain and looms could be left outside for several days. This allowed the work in the house to continue without taking the time to assemble and remove a loom daily.[171] As a weaver who has experimented with ground looms, I believe that leaving the loom assembled allowed for a more even tension on the warp thereby creating a more consistent and professional product.

[169] Barber, *Women's Work*, 186-187.
[170] Graves-Brown, *Dancing for Hathor*, 73-74.
[171] Carol Meyers, "Women's Daily Life (Iron Age Israel)," *Women in Antiquity*, August 12, 2016, 524–36, https://doi.org/10.4324/9781315621425-57, 491.

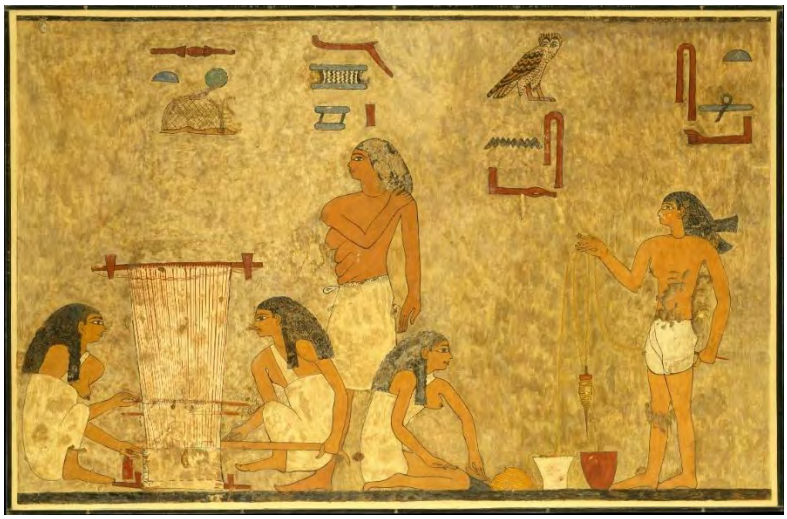

FIGURE 7.1 - Weavers, Tomb of Khnumhotep, by Norman de Garis Davies (MET, 33.8.16). Creative Commons

We know that men were also active participants in the textile trades as well. As noted above, they were active spinners of twine and rope. In addition, they were frequently the dyers as well as the fullers and laundry people. This was especially true in Egypt where historians believe that because these jobs were frequently done in lakes and rivers, the abundance of crocodiles made these jobs extremely hazardous, especially for those with small children.[172] Therefore, any job which required large amounts of water, from a river or stream, was delegated to men.

Men also were responsible for weaving mats and other utilitarian items.[173] When the vertical two-beam loom was introduced to Egypt, men began to join women in the weavers' workshop, not only as managers, but as expert weavers themselves. Carolyn Graves-Brown, in her book *Dancing for Hathor,* posits that the vertical two-beam loom is a more complex tool, which may have attracted men to a trade that had previously been seen as simplistic[174] and tomb paintings like those at Beni Hasan show primarily men

[172] Barber, *Women's Work*, 198.
[173] Barber, *Prehistoric Textiles,* 286.
[174] Graves-Brown, *Dance for Hathor*, 78.

weaving on the vertical two-beam loom. However, the Bronze Age Meketre weaving workshop diorama (Figure 7.2) depicts women alone. Therefore, men may have been part of the weaving, and of course, Bezalel and Oholiab managed the project, but I like to believe that women were the driving force in the creation of textiles of the *Mishkan*.

FIGURE 7.2 – Close-up of the weaver's workshop diorama from the Tomb of Meketre found in the National Museum of Egyptian Civilization, Cairo. Photo by Merja Attia. Used with the permission of the photographer. (2022).

Chapter 8

CONCLUSION

The Israelites may have recently left Egypt, but Egypt did not leave them. They carried with them the techniques, skills, and experiences, much like the goods that they "borrowed," into freedom. As newly freed people, they were undisciplined and wild, perhaps without a purpose for the first time in their lives. We see that when left to themselves, while Moses was on Mount Sinai, their fear and uncertainty got the best of them, and they created the Golden Calf. To prevent another such occurrence, they needed a project, something that the entire community could support and be a part of. This has been a common way throughout history to build community: from making bandages and socks during World War I to the Victory Gardens in World War II, people have banded together in a common undertaking, solidifying community through a unified, common goal. Whether YHVH and Moses were aware of it or not, the creation of the *Mishkan* was the project that united a group of slaves and began their transformation into what would be the people of Israel.

When we read these verses from Exodus, we can imagine the hustle and bustle of people working each day towards this common goal. (Figure 8.1) Maybe the men were building the framework, pounding metals, and gathering materials. In another section of the camp, the one dedicated to textiles, the spinners and weavers of the *Mishkan*, women and children, sat before large looms and bales of colored wool. Children may be running between the ground looms, bringing extra weft to the weavers, or lifting heddles. Like time immemorial, women heavy in pregnancy may be tending the smaller children, spindles in hand, laughing and sharing stories and experiences.

Possibly a group of older women and men are sitting next to the fire, pots of bubbling dye ready for wool. They are carding the mounds of goats' hair before them; laughing at a joke, while others are preparing the daily meals. Men may be carrying the heavy loads of yarn and fibers, finding a water source in which to launder and full the cloth, and of course, groups of two and three men and women together, may be seated at the vertical two-beam looms slowly working figures of cherubim into the growing cloth. Each person, whether young or old, played an integral part in the creation of the cloth for the *Mishkan*. It truly would have been the work of their hearts.

The site of the mountains of cloth and the wooden structures growing day by day must have been awe-inspiring. At last, when everything was ready to go, they placed the canopies upon the *Mishkan*; took the Ark of the Covenant, the Menorah, and the table, and placed them within. The screens went up and the brilliant white fabric was attached to the posts of the enclosure. Children may have been running in between the large white sheets as they fluttered gently in the desert breeze. The project was done and the *Mishkan* was complete. The many days and weeks of hard work were done and now it was ready for dedication. Did they sing songs in praise of their work and of their God? Were the people clapping and cheering or were they solemn in the last moments as Moses anointed it and blessed it? We will never know, but we do have an idea of the time and effort it took to create the *Mishkan*. Each year as we reach the end of the Book of Exodus and read the last line, "For the cloud of YHVH was upon the *Mishkan* during the day and a fire would appear at night there in view of all of the House of Israel and throughout their journey," we can see not only their awe and love for the God that brought them out of Egypt, but the pride they must have felt as the looked at this, the

house of YHVH, that they made with love. The *Mishkan* that they made with their own hands.

FIGURE 8.1 17th century illustration by Jan Luyken (1649-1712) entitled "Oprichting des tabernakels inde woestine door den dienst der Leviten" (The Erection of the Tabernacle in the Wilderness by the Service of the Levites) Found in the Amsterdam Museum. Accession number: Inv.nr A 19813. Public Domain. Creative Commons.

BIBLIOGRAPHY

Al-Gaoudi, Hanaa A., and Nermin M. Aly. “The Characterization of Some Ancient Egyptian Funerary Linens from the Twenty-First Dynasty Discovered in the Bab El-Gasus Excavation.” *The Journal of Egyptian Archaeology* 107, no. 1–2 (June 2021): 115–28. https://doi.org/10.1177/03075133211022364.

Almalech, Mony. “Cultural Unit Blue in the Old Testament.” *Language and Semiotic Studies* 9, no. 2 (May 31, 2023): 185–223. https://doi.org/10.1515/lass-2023-2001.

Amar, Zohar, Hugo Gottlieb, Lucy Varshavsky, and David Iluz. “The Scarlet Dye of the Holy Land.” *BioScience* 55, no. 12 (2005): 1080. https://doi.org/10.1641/0006-3568(2005)055[1080:tsdoth]2.0.co;2.

Barber, E. J. “New Kingdom Egyptian Textiles: Embroidery vs. Weaving.” *American Journal of Archaeology* 86, no. 3 (July 1, 1982): 442–45. https://doi.org/10.2307/504433.

Barber, Elizabeth J.W. *Prehistoric textiles the development of cloth in the Neolithic and bronze ages with special reference to the Aegean. Barber, E. J.W*. Princeton, NJ: Princeton University Press, 2021.

Barber, Elizabeth J.W. “Weaving the Social Fabric.” Essay. In *Ancient Textiles*, 173–78. Oxford, UK: Oxbrow, 2014.

Barber, Elizabeth Wayland, PhD. *Women’s Work - The First 20, 000 years: Women, Cloth, and Society in Early Times*. New York: W.W. Norton, 1996.

Breniquet, Catherine. “Early Wool of Mesopotamia, c. 7000–3000 BC. between Prestige and Economy.” *The Competition of Fibres*, April 30, 2020, 17–26. https://doi.org/10.2307/j.ctv13pk7d6.9.

Brewer, Douglas. Essay. In *A History of the Animal World in the Ancient near East*, 425–56. Leiden, The Netherlands: Brill, 2002.

Brown, Francis, S. R. Driver, Charles A. Briggs, G. R. Driver, Emil Roediger, Edward Robinson, and Wilhelm Gesenius. *A Hebrew and english lexicon of the old testament: With an appendix containing the biblical aramaic*. Oxford: Clarendon Press, 1952.

Budge, E. A. Wallis. *An Egyptian hieroglyphic dictionary: With an index of English words*. London: J. Murray, 1920.

Carasik, Michael. *The Commentators’ Bible: The JPS Miqra’ot Gedolot: Exodus*. Philadelphia PA: The Jewish Publication Society, 2005.

Carter, Howard, Percy E. Newberry, G. Maspero, and Grafton Elliot Smith. *The tomb of thoutmôsis IV, by Howard Carter and Percy E. Newberry; with an essay on the King's Life and monuments by Gaston Maspero ... and a paper on the physical characters of the mummy of Thoutmôsis IV, by G. Elliot Smith* . Westminster: A. Constable and Co, 1904.

Cooksey, Chris. "Recent Advances in the Understanding of the Chemistry of Tyrian Purple Production from Mediterranean Molluscs." Essay. In *Treasures from the Sea*, 73–78. London: Oxbow Books, 2017.

Cross, Frank M. "The Tabernacle: A Study from an Archaeological and Historical Approach." *The Biblical Archaeologist* 10, no. 3 (September 1947): 45–68. https://doi.org/10.2307/3209346.

Davis, Menachem, Nosson Scherman, Meir Zlotowitz, Yaakov Blinder, and Sheah Brander. *Interlinear chumash: The Torah, Haftaros and five megillos with an interlinear translation and an anthologized commentary*. Brooklyn, N.Y: Mesorah Publications, 2010.

Degen, A. Allan, and Shaher El-Meccawi. "Ground Loom Weaving Among Negev Bedouin Women." Essay. In *Artisan and Handicraft Entrepreneurs*, 3–32. Cham, Switzerland: Springer, 2022.

Dever, William G. *Who Were the Early Israelites and Where Did They Come From?* Grand Rapids, Mich: William B. Eerdmans Pub. Co, 2006.

Dilek, Yeşim, and Pınar Gözlük Kırmızıoğlu. "Varicolored Wool in Ancient Treatment Rituals." *İstanbul Antropoloji Dergisi / Istanbul Anthropological Review* 0, no. 0 (December 13, 2022): 0–0. https://doi.org/10.26650/iar2022-1183927.

Firth, Richard, and Marie-Louise Nosch. "Spinning and Weaving Wool in Ur III Administrative Texts." *Journal of Cuneiform Studies* 64, no. 1 (January 2012): 65–82. https://doi.org/10.5615/jcunestud.64.0065.

Forbes, R.J. *Studies in Ancient Technology*. Vol. 4. New York, NY : Brill, 1956.

Friedman, Richard Elliott. "The Exodus Is Not Fiction." *Reform Judaism* 42, no. 3, Spring 2014.

Graves-Brown, Carolyn. *Dancing for Hathor: Women in Ancient Egypt*. New York: Bloomsbury, 2013.

Hall, Rosalind M. *Egyptian textiles*. Princes Risborough, Buckinghamshire: Shire, 2001.

Hill, G. F. "Some Graeco-Phoenician Shrines." *The Journal of Hellenic Studies* 31 (November 1911): 56–64. https://doi.org/10.2307/624736.

Hoffmeier, James Karl. *Ancient Israel In Sinai: The evidence for the authenticity of the wilderness tradition*. New York: Oxford University Press, 2011.

Homan, Michael M. *To Your Tents, O Israel!: The terminology, function, form, and symbolism of tents in the Hebrew Bible and the ancient near east*. Leiden: Brill, 2002.

Janssen, Rosalind M. "The 'Ceremonial Garments' of Tuthmosis IV Reconsidered." *Studien Zur Altägyptischen Kultur*, 1992, 19 (n.d.): 217–24.

Jastrow, Marcus. *A Dictionary of The Targumim, The Talmud Babli And Yerushalmi, And The Midrashic Literature*. 1995 ,חורב :ירושלים.

Jensen, Bethany, R. Paul Evans, Giovanni Tata, and Kerry Muhlestein. "They'll Never Be Royals: The 'Purple' Textiles of Fag El-Gamous." *Excavations at the Seila Pyramid and Fag el-Gamous Cemetery*, November 18, 2019, 207–48. https://doi.org/10.1163/9789004416383_011.

"Julius Wellhausen." Encyclopædia Britannica. Accessed October 5, 2024. https://www.britannica.com/biography/Julius-Wellhausen.

Jørgensen, Lise Bender, Antoinette Rast-Eicher, and Willeke Wendrich. "Earliest Evidence for Textile Technologies." *Paléorient*, no. 49–1 (June 22, 2023): 213–28. https://doi.org/10.4000/paleorient.2479.

LePage, Michael. "Oldest Ever Piece of String Was Made by Neanderthals 50,000 Years Ago." New Scientist, April 15, 2020. https://www.newscientist.com/article/2240117-oldest-ever-piece-of-string-was-made-by-neanderthals-50000-years-ago/.

Kamel Soleman, Rasha. "The Central Role of White Linen in Ancient Egyptian Women's Dresses & Fashion." *مجلة كلية الآداب. جامعة القاهرة*7, no. 7 (June 1, 2020): 1–20. https://doi.org/10.21608/mkaf.2020.125642.

Kamrin, Janice. "The Aamu of Shu in the Tomb of Khnumhotep II at Beni Hassan." *Journal of Ancient Egyptian Interconnections* 1, no. 3 (September 16, 2010). https://doi.org/10.2458/azu_jaei_v01i3_kamrin.

Kanold, Inge Boesken. "Dyeing Wool and Sea Silk with Purple Pigment from Hexaplex Trunculus." Essay. In *Treasures from the Sea*, 67–72. London: Oxbrow, 2017.

Keith, Kathryn. "Spindle Whorls, Gender, and Ethnicity at Late Chalcolithic Hacinebi Tepe." *Journal of Field Archaeology* 25, no. 4 (1998): 497–515. https://doi.org/10.2307/530641.

Klein, Ernest, and Baruch Sarel. *A comprehensive etymological dictionary of the Hebrew language for readers of English*. New York, London: Macmillan ; Collier Macmillan, 1987.

Lidz, Franz. “In Israel, a 3,000-Year-Old Purple Factory.” *The New York Times*, March 5, 2024. https://www.nytimes.com/2024/03/05/science/archaeology-tyrian-purple-murex.html?smid=url-share.

Loring, Edward. “The Leather Funerary Baldachin of Isetemkheb.” *Ancient Egypt* 11, no. 6 (2011): 52–55.

McClintock , John, and James Strong, eds. “Linen .” McClintock and Strong Biblical Cyclopedia Online. Accessed October 18, 2024. https://www.biblicalcyclopedia.com/L/linen.html.

Meyers, Carol. “Women’s Daily Life (Iron Age Israel).” *Women in Antiquity*, August 12, 2016, 524–36. https://doi.org/10.4324/9781315621425-57.

Newberry, Percy E., and G. Willoughby Fraser. *Beni Hasan Part 1*. Edited by F.L. Griffith. London: Kegan Paul, Trench, Trübner, & Co., 1893.

Nosch, Marie-Louise, and Cecile Michel. *Textile terminologies: In the Ancient Near East and Mediterranean from the third to the first Millennnia BC*. Oxford, Oakville: Oxbow Books, Limited Casemate Academic distributor, 2013.

Roets, Merida. “Goats in the Ancient Near East and Their Relationship with the Mythology, Fairytale and Folklore of These Cultures.” *Goats (Capra) - From Ancient to Modern*, July 15, 2020. https://doi.org/10.5772/intechopen.82531.

Rosen, Steven A., and Benjamin A. Saidel. “The Camel and the Tent: An Exploration of Technological Change Among Early Pastoralists.” *Journal of Near Eastern Studies* 69, no. 1 (April 2010): 63–77. https://doi.org/10.1086/654940.

Rosman, Murray Jay. *How Jewish is Jewish History?* Oxford: The Littman Library of Jewish Civilization, 2020.

Roth, H. Ling (Henry Ling). *Ancient Egyptian and Greek looms H. Ling (Henry Ling) Roth*. S.I.: Project Gutenberg, 2020.

Ryder, Michael. “The Use of Goat Hair an Introductory Historical Review.” *Anthropozoologica* No. 17 (1993): 37–46.

Sagiv, Gadi. “Deep Blue: Notes on the Jewish Snail Fight.” *Contemporary Jewry* 35, no. 3 (May 24, 2015): 285–313. https://doi.org/10.1007/s12397-015-9138-1.

Sargent Johnson, Nellie. “Historical Background of Double Woven Cloth.” *Supplement to the Handicrafter* Vol. 5, no. 4 (n.d.): 1–6.

Sarna, Nahum M. *The JPS Torah Commentary: Exodus/שמות*. Philadelphia, PA: The Jewish Publication Society, 2001.

Shamir, Orit. “Two Special Traditions in Jewish Garments and the Rarity of Mixing Wool and Linen Threads in the Land of Israel.” *Prehistoric, Ancient Near Eastern & Aegean Textiles and Dress*, September 30, 2014, 297–308. https://doi.org/10.2307/j.ctvh1drkt.17.

“Smelly Snails and Deep Purple: This Ancient Dye Costs $2,700 per Gram.” *Middle East Eye.* Accessed February 6, 2025. https://www.middleeasteye.net/discover/colour-purple-dyeing-techniques-phoenician-sea-snails.

Smith, Joanna S. “Tapestries in the Bronze and Early Iron Ages of the Ancient near East.” *Textile Production and Consumption in the Ancient Near East*, January 11, 2013, 161–88. https://doi.org/10.2307/j.ctvh1dvx0.13.

Sterman, Baruch, and Judy Taubes Sterman. *The Rarest Blue: The Remarkable Story of an Ancient Color Lost to History and Rediscovered*. Jerusalem: Ptil Tekhelet, 2017.

Stuart, Villiers. *The Funeral Tent of an Egyptian Queen: Printed in Colours, in Facsimile, From the Author’s Drawing Taken at Boulak*. London: John Murray, 1882.

Stub, Sara Toth. “The Price of Purple.” *Archaeology* 73, no. 6 (2020): 59–64.

Sukenik, Naama, David Iluz, Zohar Amar, Alexander Varvak, Orit Shamir, and Erez Ben-Yosef. “Early Evidence of Royal Purple Dyed Textile from Timna Valley (Israel).” *PLOS ONE* 16, no. 1 (January 28, 2021). https://doi.org/10.1371/journal.pone.0245897.

Thorpe, Azalea Stuart, Jack Lenor Larsen, and Mary Lyon. *Elements of Weaving: A Complete Introduction to the Art and Techniques*. Garden City, N.Y: Doubleday, 1978.

Tigay, Jeffrey H. “Parashat Terumah.” Essay. In *Learn Torah With...*, edited by S. Kelman and J.L. Grishaver, 141–47. Los Angeles, CA: Alef Design Group, 1996.

Toth Stub, Sara. “Letter from Israel - the Price of Purple - Archaeology Magazine - November/December 2020.” Archaeology Magazine , June 15, 2024. https://archaeology.org/issues/november-december-2020/letters-from/israel-purple-dye/.

"Tutankhamun." *The Metropolitan Museum of Art Bulletin*, New Series, 34, no. 3 (Winter 1976): 1. https://doi.org/10.2307/3269009.

Vogelsang-Eastwood, Gillian. "Textiles." Essay. In *Ancient Egyptian Materials and Technology*, 268–98. Cambridge, UK: Cambridge University Press, 2009.

Winlock, H. E. "The Egyptian Expedition 1918-1920: II. Excavations at Thebes 1919-20." *The Metropolitan Museum of Art Bulletin* 15, no. 12 (December 1920): 1. https://doi.org/10.2307/3253881.

Workman, Vanessa, Orit Shamir, Naama Sukenik, Diana M. Medellin Martinez, and Christina Margariti. "Textile Production, Consumption, and Trade in Early Iron Age Copper Smelting Sites at Timna, Israel : A Preliminary Summary of Results ." *Archaeological Excavations and Research Studies in Southern Israel* 6 (2023): 47–60.

Wright, Rita P. "Sumerian and Akkadian Industries: Crafting Textiles." Essay. In *The Sumerian World*, 395–417. New York, NY: Routledge, 2013.

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3.2 Ibid, Plate II.

3.3 G. F. Hill, "Some Graeco-Phoenician Shrines," *The Journal of Hellenic Studies* 31 (November 1911): 56–64, https://doi.org/10.2307/624736. Plate III.

3.4 Photo by Merja Attia. Used with permission of the photographer. https://www.flickr.com/photos/130870_040871/52637013319/in/photostream/

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https://www.gutenberg.org/files/25731/25731-h/25731-h.htm

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https://commons.wikimedia.org/wiki/File:Kermes_-_Neve_Tzuf.jpg

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5.7 Creative Commons Media. https://commons.wikimedia.org/wiki/File:Wool_techelet.jpg

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Exodus – Chapter 25:1-9

א וַיְדַבֵּר יְהוָה אֶל־מֹשֶׁה לֵּאמֹר׃

1 And YHVH spoke to Moses saying:

ב דַּבֵּר אֶל־בְּנֵי יִשְׂרָאֵל וְיִקְחוּ־לִי תְּרוּמָה מֵאֵת כָּל־אִישׁ אֲשֶׁר יִדְּבֶנּוּ לִבּוֹ תִּקְחוּ אֶת־תְּרוּמָתִי׃

2 Speak to the Children of Israel and they will bring to me an offering, from every person who willingly gives from his heart you will take my offering.

ג וְזֹאת הַתְּרוּמָה אֲשֶׁר תִּקְחוּ מֵאִתָּם זָהָב וָכֶסֶף וּנְחֹשֶׁת׃

3 And this is the offering that you shall take from them: gold, silver and copper,

ד וּתְכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ וְעִזִּים׃

4 Blue[175], purple,[176] and scarlet yarns,[177] linen and goats' (hair),

ה וְעֹרֹת אֵילִם מְאָדָּמִים וְעֹרֹת תְּחָשִׁים וַעֲצֵי שִׁטִּים׃

5 And ram skins dyed red, dolphin/badger skins and acacia wood,

ו שֶׁמֶן לַמָּאֹר בְּשָׂמִים לְשֶׁמֶן הַמִּשְׁחָה וְלִקְטֹרֶת הַסַּמִּים׃

6 Oil for the light, spices for the anointing oil, and sweet incense,

ז אַבְנֵי־שֹׁהַם וְאַבְנֵי מִלֻּאִים לָאֵפֹד וְלַחֹשֶׁן׃

7 Onyx stones and setting stones for the ephod and the breastplate,

ח וְעָשׂוּ לִי מִקְדָּשׁ וְשָׁכַנְתִּי בְּתוֹכָם׃

8 And they shall make for me a holy place and so that I may dwell among them.

ט כְּכֹל אֲשֶׁר אֲנִי מַרְאֶה אֹתְךָ֗ אֵת תַּבְנִית הַמִּשְׁכָּן וְאֵת תַּבְנִית כָּל־כֵּלָיו וְכֵן תַּעֲשׂוּ׃ ס

[175] Traditionally thought to be a sky-blue color. As it says in Chullin 89a:3 "*Tekhelet* is similar to the sea, similar to the sky and the sky is similar to the sapphire stone…

[176]

[177]

9 As everything that I show you, it is the plans for the *Mishkan* and the plans for all its objects and just [like I have described for you] you shall make.

Exodus – Chapter 26:1-14

א וְאֶת־הַמִּשְׁכָּן תַּעֲשֶׂה עֶשֶׂר יְרִיעֹת שֵׁשׁ מָשְׁזָר וּתְכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי כְּרֻבִים מַעֲשֵׂה חֹשֵׁב תַּעֲשֶׂה אֹתָם׃

1 For the *Mishkan* you shall make ten linen curtains [from] spun/twisted yarn of blue, purple and scarlet thread. You shall make them with artistic designs of cherubim.

ב אֹרֶךְ ׀ הַיְרִיעָה הָאַחַת שְׁמֹנֶה וְעֶשְׂרִים בָּאַמָּה וְרֹחַב אַרְבַּע בָּאַמָּה הַיְרִיעָה הָאֶחָת מִדָּה אַחַת לְכָל־הַיְרִיעֹת׃

2 The length of each curtain [shall be] twenty-eight cubits and the width [shall be] four cubits. The measurement for one curtain shall be the same for all the curtains.

ג חֲמֵשׁ הַיְרִיעֹת תְּהֶיְיֶן חֻבָּרֹת אִשָּׁה אֶל־אֲחֹתָהּ וְחָמֵשׁ יְרִיעֹת חֻבְּרֹת אִשָּׁה אֶל־אֲחֹתָהּ׃

3 Five curtains shall be joined, one to another and the five [other] curtains [shall be] joined, one to another.

ד וְעָשִׂיתָ לֻלְאֹת תְּכֵלֶת עַל שְׂפַת הַיְרִיעָה הָאֶחָת מִקָּצָה בַּחֹבָרֶת וְכֵן תַּעֲשֶׂה בְּשְׂפַת הַיְרִיעָה הַקִּיצוֹנָה בַּמַּחְבֶּרֶת הַשֵּׁנִית׃

4 And you shall make loops of blue [yarn from the] edge to the selvedge on one [set] of curtains and so too, you will make [blue yarn loops] on the outermost edge of the second set of curtains.

ה חֲמִשִּׁים לֻלָאֹת תַּעֲשֶׂה בַיְרִיעָה הָאֶחָת וַחֲמִשִּׁים לֻלָאֹת תַּעֲשֶׂה בִּקְצֵה הַיְרִיעָה אֲשֶׁר בַּמַּחְבֶּרֶת הַשֵּׁנִית מַקְבִּילֹת הַלֻּלָאֹת אִשָּׁה אֶל־אֲחֹתָהּ׃

5 You shall make fifty loops on one curtain and fifty loops on the opposite edge of the second set [of curtains, so] that they may be clasped, one loop to the other.

ו וְעָשִׂיתָ חֲמִשִּׁים קַרְסֵי זָהָב וְחִבַּרְתָּ אֶת־הַיְרִיעֹת אִשָּׁה אֶל־אֲחֹתָהּ בַּקְּרָסִים וְהָיָה הַמִּשְׁכָּן אֶחָד: פ

6 And you shall make fifty gold clasps and join the curtains together with the clasps, so that the *Mishkan* shall be one.

ז וְעָשִׂיתָ יְרִיעֹת עִזִּים לְאֹהֶל עַל־הַמִּשְׁכָּן עַשְׁתֵּי־עֶשְׂרֵה יְרִיעֹת תַּעֲשֶׂה אֹתָם:

7 You shall make curtains of goats' hair for the tent over the *Mishkan*; you shall make eleven curtains [in all.]

ח אׇרֶךְ ׀ הַיְרִיעָה הָאַחַת שְׁלֹשִׁים בָּאַמָּה וְרׇחַב אַרְבַּע בָּאַמָּה הַיְרִיעָה הָאֶחָת מִדָּה אַחַת לְעַשְׁתֵּי עֶשְׂרֵה יְרִיעֹת:

8 The length of each curtain [shall be] thirty cubits and the width of each curtain [shall be] four cubits. The measurement for one curtain shall be the same for all eleven curtains.

ט וְחִבַּרְתָּ אֶת־חֲמֵשׁ הַיְרִיעֹת לְבָד וְאֶת־שֵׁשׁ הַיְרִיעֹת לְבָד וְכָפַלְתָּ אֶת־הַיְרִיעָה הַשִּׁשִּׁית אֶל־מוּל פְּנֵי הָאֹהֶל:

9 And you shall join five curtains by themselves and six curtains by themselves. You shall fold the sixth curtain [and place it] at the front of the tent.

י וְעָשִׂיתָ חֲמִשִּׁים לֻלָאֹת עַל שְׂפַת הַיְרִיעָה הָאֶחָת הַקִּיצֹנָה בַּחֹבָרֶת וַחֲמִשִּׁים לֻלָאֹת עַל שְׂפַת הַיְרִיעָה הַחֹבֶרֶת הַשֵּׁנִית:

10 And you shall make fifty loops [from the] edge to the selvedge on [one set] and fifty loops on the edge of the second set of curtains.

יא וְעָשִׂיתָ קַרְסֵי נְחֹשֶׁת חֲמִשִּׁים וְהֵבֵאתָ אֶת־הַקְּרָסִים בַּלֻּלָאֹת וְחִבַּרְתָּ אֶת־הָאֹהֶל וְהָיָה אֶחָד:

11 And you shall make fifty copper rings and join the rings to the loops and join the tent together and it will be one.

יב וְסֹרַחַ הָעֹדֵף בִּירִיעֹת הָאֹהֶל חֲצִי הַיְרִיעָה הָעֹדֶפֶת תִּסְרַח עַל אֲחֹרֵי הַמִּשְׁכָּן:

12 The remainder of the excess tent curtain (the half of the curtain which remains) shall hang over the back of the *Mishkan*.

יג וְהָאַמָּה מִזֶּה וְהָאַמָּה מִזֶּה בָּעֹדֵף בְּאֹרֶךְ יְרִיעֹת הָאֹהֶל יִהְיֶה סָרֹחַ עַל־צִדֵּי
הַמִּשְׁכָּן מִזֶּה וּמִזֶּה לְכַסֹּתוֹ׃

13 And a cubit from this [side] and a cubit from that [side] which remains of the length of the tent curtains shall hang over the sides of the *Mishkan*, from this [side] to that [side] to cover it.

יד וְעָשִׂיתָ מִכְסֶה לָאֹהֶל עֹרֹת אֵילִם מְאָדָּמִים וּמִכְסֵה עֹרֹת תְּחָשִׁים
מִלְמָעְלָה׃ פ

14 And you shall make a covering for the tent of ram skins dyed red and a covering of skins from a badger/dolphin above that.

לא וְעָשִׂיתָ פָּרֹכֶת תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ מָשְׁזָר מַעֲשֵׂה חֹשֵׁב
יַעֲשֶׂה אֹתָהּ כְּרֻבִים:

31 And you shall make a *parochet* [curtain] of blue, purple, and red yarn and fine twisted linen yarn. You shall make them with artistic designs of cherubim.

לב וְנָתַתָּה אֹתָהּ עַל־אַרְבָּעָה עַמּוּדֵי שִׁטִּים מְצֻפִּים זָהָב וָוֵיהֶם זָהָב עַל־
אַרְבָּעָה אַדְנֵי־כָסֶף:

32 And you shall place it [the *parochet*] upon four pillars of acacia wood overlaid in gold and their hooks of gold upon the four silver sockets.

לג וְנָתַתָּה אֶת־הַפָּרֹכֶת תַּחַת הַקְּרָסִים וְהֵבֵאתָ שָׁמָּה מִבֵּית לַפָּרֹכֶת אֶת אֲרוֹן
הָעֵדֻת וְהִבְדִּילָה הַפָּרֹכֶת לָכֶם בֵּין הַקֹּדֶשׁ וּבֵין קֹדֶשׁ הַקָּדָשִׁים:

33 And you shall place the *parochet* under the clasps and you shall bring there from the house behind the *parochet* the Ark of the Testimony and the *parochet* will be a separation between the holy [place] and the Holy of Holies.

לד וְנָתַתָּ אֶת־הַכַּפֹּרֶת עַל אֲרוֹן הָעֵדֻת בְּקֹדֶשׁ הַקָּדָשִׁים:

34 And you shall place the *parochet* upon the Ark of the Testimony in the Holy of Holies.

לה וְשַׂמְתָּ אֶת־הַשֻּׁלְחָן מִחוּץ לַפָּרֹכֶת וְאֶת־הַמְּנֹרָה נֹכַח הַשֻּׁלְחָן עַל צֶלַע
הַמִּשְׁכָּן תֵּימָנָה וְהַשֻּׁלְחָן תִּתֵּן עַל־צֶלַע צָפוֹן:

35 And you shall put the table outside the *parochet* and the *menorah* across from the table on the south side of the *Mishkan* and the table you shall put upon the north side.

לו וְעָשִׂיתָ מָסָךְ לְפֶתַח הָאֹהֶל תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ מָשְׁזָר
מַעֲשֵׂה רֹקֵם:

36 And you shall make a [woven] screen for the opening of the tent of blue, purple, and red yarns and fine linen yarn made by a weaver.

לז וְעָשִׂיתָ לַמָּסָךְ חֲמִשָּׁה עַמּוּדֵי שִׁטִּים וְצִפִּיתָ אֹתָם זָהָב וָוֵיהֶם זָהָב וְיָצַקְתָּ לָהֶם חֲמִשָּׁה אַדְנֵי נְחֹשֶׁת: ס

37 And you shall make for the screen, five pillars of acacia wood and overlay them in gold and their hooks of gold and you shall cast for them fine sockets of copper.

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ט וְעָשִׂיתָ אֶת חֲצַר הַמִּשְׁכָּן לִפְאַת נֶגֶב־תֵּימָנָה קְלָעִים לֶחָצֵר שֵׁשׁ מָשְׁזָר מֵאָה בָאַמָּה אֹרֶךְ לַפֵּאָה הָאֶחָת:

[9]You shall make the enclosure of the *Mishkan*. On the south side curtains for the enclosure of fine spun linen, 100 cubits long for that one side.

י וְעַמֻּדָיו עֶשְׂרִים וְאַדְנֵיהֶם עֶשְׂרִים נְחֹשֶׁת וָוֵי הָעַמֻּדִים וַחֲשֻׁקֵיהֶם כָּסֶף:

[10]And its twenty posts with twenty copper sockets, and hooks and bands of the posts to be of silver.

יא וְכֵן לִפְאַת צָפוֹן בָּאֹרֶךְ קְלָעִים מֵאָה אֹרֶךְ וְעַמֻּדָו]וְעַמּוּדָיו[עֶשְׂרִים וְאַדְנֵיהֶם עֶשְׂרִים נְחֹשֶׁת וָוֵי הָעַמֻּדִים וַחֲשֻׁקֵיהֶם כָּסֶף:

[11]And likewise, for the north side a length of curtain of 100 [cubits] long and its 20 posts with twenty copper sockets, and hooks and bands of the posts to be of silver.

יב וְרֹחַב הֶחָצֵר לִפְאַת־יָם קְלָעִים חֲמִשִּׁים אַמָּה עַמֻּדֵיהֶם עֲשָׂרָה וְאַדְנֵיהֶם עֲשָׂרָה:

[12]And for the width of the enclosure on the west side, curtains 50 cubits [long and] its tent posts and their ten sockets.

יג וְרֹחַב הֶחָצֵר לִפְאַת קֵדְמָה מִזְרָחָה חֲמִשִּׁים אַמָּה:

[13]And for the width for the front of the enclosure on the east side, 50 cubits.

יד וַחֲמֵשׁ עֶשְׂרֵה אַמָּה קְלָעִים לַכָּתֵף עַמֻּדֵיהֶם שְׁלֹשָׁה וְאַדְנֵיהֶם שְׁלֹשָׁה׃

[14]And 15 cubits of curtains on one shoulder with its three posts and three sockets.

טו וְלַכָּתֵף הַשֵּׁנִית חֲמֵשׁ עֶשְׂרֵה קְלָעִים עַמֻּדֵיהֶם שְׁלֹשָׁה וְאַדְנֵיהֶם שְׁלֹשָׁה׃

[15]And on the other shoulder, 15 cubits of curtains with its three posts and three sockets.

טז וּלְשַׁעַר הֶחָצֵר מָסָךְ ׀ עֶשְׂרִים אַמָּה תְּכֵלֶת וְאַרְגָּמָן וְתוֹלַעַת שָׁנִי וְשֵׁשׁ מָשְׁזָר מַעֲשֵׂה רֹקֵם עַמֻּדֵיהֶם אַרְבָּעָה וְאַדְנֵיהֶם אַרְבָּעָה׃

[16] And for the gate of the enclosure a screen of 30 cubits in blue, purple, and scarlet red and fine spun linen, the work of a weaver, and its four posts and four sockets.

יז כָּל־עַמּוּדֵי הֶחָצֵר סָבִיב מְחֻשָּׁקִים כֶּסֶף וָוֵיהֶם כֶּסֶף וְאַדְנֵיהֶם נְחֹשֶׁת׃

[17] All the posts of the enclosure will have bands of silver around them and their hooks will be of silver and their sockets shall be of copper.

יח אֹרֶךְ הֶחָצֵר מְאָה בָאַמָּה וְרֹחַב ׀ חֲמִשִּׁים בַּחֲמִשִּׁים וְקוֹמָה חָמֵשׁ אַמּוֹת שֵׁשׁ מָשְׁזָר וְאַדְנֵיהֶם נְחֹשֶׁת׃

[18]The length of the enclosure will be 100 cubits and the width shall be fifty by fifty and the height shall be five cubits [with curtains made] of fine spun linen and their sockets shall be of copper.

יט לְכֹל ׀ כְּלֵי הַמִּשְׁכָּן בְּכָל עֲבֹדָתוֹ וְכָל־יְתֵדֹתָיו וְכָל־יִתְדֹת הֶחָצֵר נְחֹשֶׁת׃

[19]And all the tools of the *Mishkan* for all its work and all its pegs and all pegs of the enclosure shall be of copper.