

O.H. 9.5.2019
Rabbi David Booth

A Thread of Blue

Approved November 12, 2019 (16-4-1). Voting in favor: Rabbis Elliot Dorff (Chair), Pamela Barmash (Co-Chair), Noah Bickart, David Booth, Baruch Frydman-Kohl, Susan Grossman, Judith Hauptman, Joshua Heller, Jeremy Kalmanofsky, Jan Kaufman, Daniel Nevins, Micah Peltz, Avram Reisner, Robert Scheinberg, Deborah Silver, Ariel Stofenmacher, Ellen Wolintz-Fields. Voting against: Rabbis Aaron Alexander, Gail Labovitz, Amy Levin, Iscah Waldman. Abstaining: Rabbi Susan Grossman.

Question: Does the tekhelet commercially available today fulfill the biblical commandment to wear tekhelet? If so, are we then commanded to wear that tekhelet in our tzitzit?

Answer:

There are several issues to consider. First, what is the nature of the commandment in Numbers to wear tekhelet in the tzitzit? Second, why did the practice of having a thread of tekhelet fall into disuse? Third, is its rediscovery authentic? And finally, if it is, what obligation does that create today?

This also raises a fundamental question about halakhic process and development. It is my view that scientific evidence and historical research are relevant to the halakhic process. When we learn something new or rediscover something lost, that discovery has halakhic validity. As a result, I am assuming that IF we could find tekhelet, then it would be appropriate to resume wearing it. I discard out of hand a theology or process that assumes once such practices develop that they are unchangeable.

Section I: The Commandment to wear tekhelet

Numbers 15:38 enjoins all Jews to wear a thread of tekhelet.

דָּבַר אֱלֹהֵי יִשְׂרָאֵל, וְאָמְרָת אֲלֵהֶם, וַעֲשׂוּ לָהֶם צִיצִית עַל-כַּנְּפֵי בְגָדֵיהֶם, לְזֵרוֹתָם; וְנָתַנוּ עַל-צִיצִית הַכַּנָּף, פֶּתִיל תְּכֵלֶת וְהָיָה לָכֶם לְצִיצִית וּרְאִיתֶם אֹתוֹ וּזְכַרְתֶּם אֶת-כָּל-מִצְוֹת יְהוָה וַעֲשִׂיתֶם אֹתָם

God spoke to the children of Israel saying: You shall make tsitsit on the corners of your garments throughout your generations. And you shall place upon the tsitsit a corner of a thread of tekhelet. You shall see it and remember all the commandments of God and you shall do them.

The Midrash and Rabbinic sources are full of praise of tekhelet and why and how it elevates the practice of wearing a tallit. For example, in B. Menachot 43b Rabbi Meir teaches:

תניא היה ר' מאיר אומר מה נשתנה תכלת מכל מיני צבעונין מפני שהתכלת דומה לים וים דומה לרקיע ורקיע לכסא הכבוד שנאמר (שמות כד, י) ותחת רגליו כמעשה לבנת הספיר וכעצם השמים לטהר וכתוב (יחזקאל א, כו) כמראה אבן ספיר דמות כסא.

It is taught in a baraita that Rabbi Meir would say: What is different about tekhelet from all other types of colors? It is because tekhelet is similar in its color to the sea, and the sea is similar to the sky, and the sky is similar to the Throne of Glory, as it is stated: "And they saw the God of Israel; and there was under His feet the like of a paved work of sapphire stone, and the like of the very heaven for clearness" (Exodus 24:10), indicating that the sky is like a sapphire brickwork.

Seeing the tekhelet, then, is a mitzvah itself that reminds the viewer of the other mitzvot. Similar to prayer, the viewing inspires a mental state that reminds us of awe to inspire observance. Put another way, the tekhelet are there to inspire a state of God-consciousness in which the viewer is attentive to the mitzvot.

Tzitzit are enjoined to be attached to all four cornered garments. Each four-cornered garment has four sets of four threads at each corner. On each set of tsitsit there should be one thread of tekhelet. The tekhelet is the only color specified; the other threads are there to provide the contrast for the tekhelet. Seeing the tekhelet is meant to remind the viewer to turn towards God and observe the mitzvot.

As the practice was described in the early Rabbinic era, there were three white threads tied together with one tekhelet thread. Hence the Mishnah in Berakhot 1:2 determining the time for the morning Shma:

מאימתי קורין את שמע בשחרית משיכיר בין תכלת ללבן

From when is the time of saying Shma in the morning? When one can tell the difference between tekhelet and white.

Once there is enough light to see the contrast between the white and blue threads a person may recite the Shma. This may imply that tzitzit at the time were regularly of blue and white which makes this a useful teaching.

However, there is some ambiguity among the rishonim as to the color of the remaining threads. Maimonides in Hilkhos Tzitzit 1:1 teaches that the remaining threads are referred to as white since they are not dyed.

וְזֶה הַקָּנָף הוּא הַנִּקְרָא לְכֹן מִפְּנֵי שְׂאִין אָנוּ מְצוּיִן לְצַבְעוֹ.

This corner is called white since there is no commandment to dye it.

Thus, they are the same color as the rest of the garment. Yosef Karo in S.A. O.H. 9:5 follows this practice and rules that the tzitzit and the tallit need to be of the same color. Moses Isserles in the Shulkhan Arukh O.H. 9:5 by contrast, rules that the threads must always be white but the tallit may be of others colors. Caro first rules:

י"א שצריך לעשו' הציצי' מצבע הטלית והמדקדקים נוהגים כן :

Some say that its necessary that the color of the tzitzit and tallit are the same and that the precise ones practice in this way.

And then Isserles comments:

אשכנזים אין נוהגים לעשות הציציות רק לבנים אף בבגדים צבועים ואין לשנות [ת"ה סימן מ"ו]:

REMA: In Ashekenaz we have no practice and make the tzitzit only white even on colored garments.

For some, the remaining threads should be the same color as the rest of the tallit; for others they should always be white. As a result, this led to a Sephardic practice of requiring all tallitot to be white to fulfill both positions. That is, since the tallit is white, the threads must also be white either because they are ALWAYS white or because they are the same color as the rest of the tallit, which is also white. For Maimonides and Karo, the garments must be white so that the threads will also be white; Isserles by contrast permits colored garments with white threads. According to all positions, the threads may only be tekhelet and white.

Midrash Tanhuma on Korakh makes clear that only one thread was permitted to be blue. According to this midrash, Korakh made a garment and tzitzit that were all tekhelet. He did this as a show of wealth and status. Since tekhelet was expensive, dying his entire garment tekhelet was a visible display of wealth. Moses forbade this, requiring that one thread and one thread only be made of this color.

The Midrash implies that tekhelet was meant to be a universal mitzvah observed by all Jews equally. As a result, it was commanded so that everyone could afford the small quantity of tekhelet dye required to fulfill the mitzvah. As Numbers 15 continues:

אֲנִי יְקֹנֵךְ אֱלֹהֶיךָ אֲשֶׁר הוֹצֵאתִי אֶתְכֶם מֵאֶרֶץ מִצְרַיִם לְהֵיוֹת לְכֶם לֵאלֹהִים אֲנִי יְקֹנֵךְ אֱלֹהֶיךָ

I am the Lord your God who brought you out of the Land of Egypt...

Since the commandment of tzitzit concludes with a general address to the entirety of the Jewish people, it is a mitzvah on everyone. We are all free people brought out of slavery and so the mitzvah must be observed in a fashion that all people can afford.

The Source of the Dye

The Tannaim describe the color as coming from a sea creature known as a chilazon. B. Menahot 44a says:

ת"ר: חלזון זהו - גופו דומה לים, וברייתו דומה לדג, ועולה אחד לשבעים שנה, ובדמו צובעין תכלת, לפיכך דמיו יקרים

The ‘Chilazon’s’ body has the color of the sea, and its form is that of a fish. It appears only once in seventy years (or in some versions 7 years) and ‘Tekhelet’ is made from its blood; therefore it is very expensive.”

They further identify that this creature lived near the coasts and produced the tekhelet color upon drying. In addition, B. Menahot forbids mixing tekhelet from plant based dyes was unacceptable. Further, its relative scarcity meant it was an expensive product.

Tekhelet could only come from the chilazon. Klai ilon, a plant based dye mentioned in Menachot 42a, was unacceptable. Klai ilon was an organic, plant based dye that produced a similar shade to tekhelet.¹ For this reason, a business in fraudulent tekhelet arose. Pesikta Zutarta, Bamidbar, Shelach, 113a warns against cheaper alternatives:

What does leaving Egypt have to do with the tekhelet? Rather, one should not say, “ I put other dyes and klai ilan which are identical to tekhelet and who can make

¹ Klai Ilon most likely comes from the Greek, klaiilon, and was then borrowed into Hebrew. It means sea blue. See for example Ernst Klein, Comprehensive Etymological Guide to the Bible.

this public?" "I am God your God," Notice what I did to the Egyptians whose bad behavior was private and I made it public.

Much like the particular recipe for plant based ink when writing a Torah, the recipe for tekhelet was known and specific to the secretions of one sea creature.

Tekhelet, then, is the central aspect of a larger mitzvah, that of wearing tsitsit. The contrast of blue on white is what draws the eye and stimulates the memory. Further, that tekhelet color must come from a specific origin to fulfill the commandment even in the presence of alternative approaches to creating an identical color.

Section II: Why did the practice fall into disuse?

B'midbar Rabbah 17:5 makes an intriguing observation:

ועכשיו אין לנו אלא לבן שהתכלת נגנז

Now we have only white, for the tekhelet has been hidden.

The meaning of hidden is somewhat ambiguous. B. Menahot, for example, says that the book of Ezekiel was nearly hidden away. That seems to suggest the book could have been lost or suppressed. Targum Yonaton on Exodus 16 similarly implies that the manna has been hidden. Again, this may mean lost or intentionally secreted away.

B'midbar Rabbah uses the same term for the tekhelet. This suggests that either the tekhelet was intentionally suppressed by Rabbinic or secular authorities OR that it was lost. By placing it as "hidden" along with the manna, they may also be placing tekhelet into a messianic context. In the same way that the manna may be returned in a messianic era, perhaps this also implies its been hidden by heaven until some redemptive future moment.

Regardless, sometime in between the composition of Mishnah Berahot 1:2 and B'midbar Rabbah the practice of wearing tekhelet fell into disuse. The Mishnah dates from 200 C.E. B'midbar Rabbah by contrast is a late midrashic collection, completed sometime in the 11th century. So what happened?

One possibility is that the tekhelet was intentionally hidden. That is, the Sages give no reason for its hiddenness. It seems more likely they are referring to an absence beyond their control. This corresponds to the view of Rabbi Jacob ben Moshe Levi Moelim who

argues against making the white threads out of plain cloth because “we may yet find the tekhelet.” Rabbi Isaac Alfasi makes a similar observation, both cited in Beit Yosef Laws of Tzitzit 8:9. Thus both Rishonim and Acharonim who discuss the matter imagine a possibility of its rediscovery and reestablished use.

There are two related theories as to what happened to tekhelet. Tyre in Lebanon was a hub of textile dyeing. They were famous for producing Tyrian purple, the Imperial color. Always desirable, the demand for Tyrian purple increased dramatically with the splendor and wealth of the Roman court. Further, as the dye became more rare and expensive, its use was limited to Roman royal officials. The Romans passed sumptuary laws forbidding the wearing of Tyrian purple. (Zaeleucus, Britannica 1911) Roman sources including Theopompus identify this purple as “fetching its weight in silver.” Roman production of tekhelet came to an abrupt end in 1200 after the sacking of Constantinople.

If, as some suggest, tekhelet was Tyrian purple, this would explain the timing and reason for tekhelet to fall into disuse. It would have been illegal for Jews to harvest the chilazon snails and so any indigenous industry in the snails would have collapsed. For example, Sanhedrin 12a mentions the arrest of two Rabbis for importing tekhelet. This both suggests a Tannaitic industry in making tekhelet and that it was of dubious legality. Further, loss of sovereignty may have also broken any indigenous industry. The Talmud in B. Shabbat 26a refers to such an industry “from Tyre to Haifa.” By the time Constantinople was sacked in 1203 CE, there would have been no way to get dye from Murex.

Second, the desirability of tekhelet drove up its price. It is possible that even a thread of tekhelet became incredibly expensive. At such a point, the key aspect of the mitzvah denoting equality would no longer have been possible to maintain. Once most people could no longer afford the threads, the practice may have fallen into disuse entirely.

Finally, some suggest the expansion of the Tyrian purple industry hunted the snail into near extinction. If this were correct, it would explain why Jews stopped wearing tekhelet: the dye was simply unavailable. And it might also explain why we lost track of which snail produced the appropriate dye since it was almost extinct.

Either way, two criteria develop as being necessary for wearing tekhelet. The singular source of the dye must be both available and relatively affordable. Something happened in the Imperial Roman era so that both criteria were no longer met, with the results the Jews wore only threads of white on their tallit.

A related issue arises around the relationship between the white and blue threads. M Menahot 4:1 states: “The tekhelet does not ritually invalidate the white, nor the white the tekhelet,” meaning white or tekhelet may still be worn even in the absence of the other.

התכלת אינה מעכבת את הלבן, והלבן אינו מעכב את התכלת.

This allowed generations of Jews to wear tallitot with only white even in the absence of tekhelet. However, now that tekhelet may have been found, how obligatory is it to wear?

The Talmud elucidates the matter further, suggesting the majority opinion is that each color is its own mitzvah. This suggests that continuing to wear a tallit with only white threads is valid but leaves another mitzvah unfulfilled.

Another position exists that validates those who continue to wear only white tzitzit. According to Rabbi Ari Kahn in an online lecture², the mitzvah of tsitsit is fulfilled by wearing the white threads alone and is fulfilled in a more perfect way by wearing tekhelet. There is only one mitzvah here and the question is how it is ideally fulfilled. Tekhelet, for him, is a sort of hiddur mitzvah, a way of elevating the practice from wearing white threads alone.

Section III: Is the rediscovery of tekhelet legitimate?

Tekhelet must meet several criteria to be the true dye needed to fulfill the mitzvah. It must be derived from a sea creature that “looks like the sea.” It must be similar in color to the dye of the klai ilan. And it ought to match archeological evidence.

French zoologist Henri de Lacaze-Duthiers was an early modern scientist searching for the snail that produced the tekhelet color according to the National Museum of France. In 1858 he determined that three Mediterranean mollusks produced stable purple blues. In his own examination of the colors, he determined that Murex trunculus was the most likely source of the Biblical blue.

Rabbi Gershon Henoch Leiner, the Radzinher Rebbe, wanted to restore the wearing of tekhelet around the same time. He was unaware of Lacaze-Duthiers work and determined that a particular squid met the criteria of the chilazon as described by the Mishnah. However, he had difficulty producing anything other than an inky black dye.

² <https://www.yutorah.org/lectures/lecture.cfm/803865/rabbi-ari-kahn/the-argument-for-tekhelet/>

He worked with an Italian chemist who developed a method of taking the black dye and turning it blue.

This led to Rabbi Isaac Herzog, Chief Rabbi of first Ireland and then Israel, to write his doctoral dissertation on Hebrew Porphyrology. Porphyrology, a term he created, is the study of purple. He examined the blue dye used by the followers of Rabbi Leiner and was discouraged to determine it was a synthetically manufactured dye known as Prussian blue. (Herzog, Chaim (1996). *Living History – A Memoir*. New York: Pantheon Books)

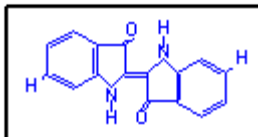
He did discover a process where the squid ink could be converted to blue. When the squid ink is first heated to a high temperature and then mixed with colorless iron fillings, the result is an apparently organic blue ink. However, this is true of virtually any organic substance. Thus the “tekhelet” from the squid is really a synthetic dye produced by the iron fillings. This dye fails to meet any of the criteria for tekhelet with the exception of its color.

Rabbi Herzog knew of Lacaze-Duthiers work but saw two problems with the *murex trunculus*. First, the snail itself is off white with brown stripes. This fails to meet the description of the snail being “like the sea itself.” Second, the color resulting from the dye was Tyrian purple rather than blue. While the yellowish ink from the snail does dramatically change color upon drying, it fails to match the klai ilon blue shade proscribed by the Rabbis.

There are solutions to each problem. When the snail is found in its natural habitat, it is surrounded by a murky discoloration of the snail and the surrounding waters, most likely as a camouflage from predators. Thus, before harvesting the snail never looks ocean blue, but does look like the surrounding, fouled, waters. It is never colored tekhelet but does resemble the surrounding sea.

The color resulting from the yellowish ink is also highly variable depending on the amount of sunlight. Professor Otto Eisner of Shenkar college noted that cloudy days produced a more purple shade while brighter sunlight resulted in a blue shade. Thus, the *Murex* is capable of producing both the royal purple dye prized by the Romans and the more blue shade described by the Rabbis.

The Tekhelet Institute, a religious-scientific institute dedicated to the restoration of tekhelet describes the chemistry of tekhelet as follows:



Inside the hypobranchial gland of the snail, the precursors to the dye exist as a clear liquid. When these are exposed to air and sunlight in the presence of the enzyme purpurase, which also exists within the gland, they turn into the dye. Purpurase quickly decomposes, so for this reaction to take place, the gland must be crushed soon after being taken from the live snail, in accordance with the Talmudic passage that the *tekhelet* is taken from the *Chilazon* while still alive. The liquid from the *trunculus*, produces a mixture of dibromindigo (purple) and indigo. These molecules must be put into solution for them to bind tightly to wool. In this state, if dibromindigo is exposed to ultraviolet light, it will transform to indigo, turning the trunculus mixture from purplish-blue to pure blue.

There is also archeological evidence to support the use of Murex for the dyeing industry. According to Dr. Naama Sukenik as reported in JNS.org on 12/13/13, "Until now, our most important discovery had been the piles and piles of murex trunculus (hillazon snail) shells from the area, which served as a silent testimony to the presence of an ancient dyeing industry in Israel"

There are piles of murex shells along the Mediterranean coast, including Tyre but also south of Tyre. These piles suggest the murex snails were used in large quantities for something, almost certainly Tyrian purple. Dr. Sukenek's findings were a step further, of actual blue fabric from the Bar Kokhba era, circa 132 C.E. "But this newest finding from the times of Bar Kokhba—sky blue fabric from the Dead Sea region—is definitive proof of both a colored fabrics trade and strict adherence to the biblical commandment of *tekhelet* in ancient Israel."

The blue dye obtained from the murex snail meets all the criteria described by the Rabbis and accords with available archeological evidence. While not certain, it appears highly likely that murex dye is indeed Biblical *tekhelet*.

Further, the requirements for *tekhelet* in the Mishnah and Maimonides, are a blue that does not fade and comes from an organic source. In other words, any organic dye that meets that criteria would fulfill the mitzvah. If this is correct, then murex unquestionably fulfills the mitzvah and may be only one way of doing this.

Section IV: Given the nearly certain nature of rediscovered *tekhelet*, what is the obligation today to wear *tekhelet*?

First is the question of certainty. For all the likelihood that murex dye is indeed Biblical tekhelet, the case is circumstantial and not certain. As a result, there does exist some doubt as to its authenticity. One might argue that such doubt prohibits the wearing of tekhelet. However, Maimonides in Hilkot Tzitzit 2:1 states that other forms of tekhelet are allowed, they simply fail to fulfill the mitzvah of wearing tekhelet and are akin to the white threads.

Since the dye does meet the criteria set out by the Rabbis and is the correct shade from an organic source that matches archeological evidence there is certainly no harm in wearing it. The evidence is insufficient to argue one **MUST** wear tekhelet, but it is strong enough to **PERMIT** the wearing of tekhelet.

A related concern is raised by Meir Soloveitchik. For him, the tradition matters. That is, once something falls out practice, it may not be restored. We now have a new practice, namely wearing only white threads. Regardless of whether or not we rediscover the source of tekhelet, we cannot wear it again because it is simply no longer the custom.

By contrast, Joseph Soloveitchik (the 20th century Soloveitchik) in correspondence with Rabbi Leiner defends this practice. (Nefesh Hrav page 51) He says if something is lost and then rediscovered, it creates an obligation to again fulfill that mitzvah. If people had stopped observing this practice while knowing the source of tekhelet, then we ought not start. If, by contrast, the practice disappeared because we didn't know the origin of the tekhelet, something was lost and then found, then we are obligated to observe it.³

This second opinion is more in line with our own approach to Halakhic practice. Scientific discovery and sociological reality are relevant to halakhic discourse and practice. Rabbi Golinkin regularly quote newly discovered teshuvot from medieval poskim for precisely this reason. Rabbi Danny Nevins consistently evaluates the science in arriving at a ruling.

Third is the way the restored practice might be viewed. The blue thread is there to remind one of the mitzvot. In private correspondence with Rabbi Eliezer Diamond, Rabbi Diamond asserted that a) the tekhelet from murex is most likely authentic and b) there is a yehara or boastfulness concern associated with wearing it. That is, if one person in a community were to wear tekhelet, they might imply in a boastful way that they are more faithful / observant than others in the community.

³ From an online lecture by Rabbi Meir Soloveitchik. <https://www.ou.org/life/torah/tekhelet-shelach/>

This third concern has real merit. We would discourage people from wearing tekhelet in a boastful manner. However, as the custom spreads, that concern becomes less and less relevant. A local Rabbi, who indeed is a spiritual leader and halakhic exemplar for his or her community, may begin wearing and encouraging others to wear tekhelet. A lay member could wear tekhelet if the Rabbi wears tekhelet or if there is a significant enough group of people in that community who wear tekhelet. The commandment is given to the Israelites in a collective sense. It is a mitzvah that ought to have a referential community of support.

Fourth, Chabad among others forbid the wearing of tekhelet because they see us in a low spiritual state.⁴ Sholom Dov Beer Schneerson, the fifth Rebbe of Chabad, says in *Shealot u'Teshuvot Torat Shalom 1* that we will not rediscover the tzitzit until the messianic era. I reject this concern.

In addition, wearing tekhelet is a marvelously nuanced Zionist statement. Some wear tekhelet with messianic presumptions that I reject. For certain religious Zionists the existence of tekhelet is entwined with our presence in the entirety of Biblical Israel. Since the tekhelet was hidden away and now rediscovered, it may portend an entry into messianic times. I find this line of reasoning disturbing and overly “pushing the end.”

As much as this line of thinking leads to messianic views that unpleasantly ferment in a political setting, I believe we can reclaim the meaning of the blue thread. The rediscovery of tekhelet is closely connected with the reestablishment of sovereignty in Israel. Further, the tekhelet are deeply entwined with the mitzvot, both ethical and ritual. Wearing them reminds us of ethical and spiritual behavior. Meaningful Zionism means being deeply connected to our moral and spiritual traditions. It means we desire the Jewish state to be a place of significant moral commitment and that our own behavior in an era of Jewish power must be colored by ethical practice. I wonder if we could reclaim the meaning of tzitzit as a challenge to Jews and to Israel to hold itself to highest ethical and spiritual standards? Seeing the blue thread calls us to our best, truest, most holy selves.

The Talmudic principle, *safek d'oreita lchumra*, would also argue for wearing tekhelet. When there is the possibility of fulfilling more perfectly a biblical commandment, one ought to do so. When there is doubt as to whether or not the mitzvah is being fulfilled, this principle suggests one engages in the act in the hope that it fulfills a biblical norm.

⁴ From Chabad.org. https://www.chabad.org/library/article_cdo/aid/530127/jewish/Tekhelet-The-Mystery-of-the-Long-Lost-Biblical-Blue-Thread.htm

The Sages repeatedly venerate the mitzvah of wearing tekhelet as a visual act to inspire God-consciousness and observance. Given the opportunity to fulfill that commandment today, we ought to do so. The doubt and boastfulness concerns are sufficient to empower those who choose to only wear white. Yet the intent here is to encourage the wearing of tekhelet in our communities.

Wearing tekhelet serves an educational purpose and creates a visual reminder for those who wear it. The tallit remains a nearly universal Jewish garment in our Synagogues and its dramatic impact on people would be great if it looked as described by the Book of Numbers.

Ruling:

Given the likelihood that murex dye is Biblical tekhelet, we permit and encourage people to add in one tekhelet thread to the three white on their tallitot, with the sense that this may even be fulfilling a biblical commandment. At the same time, out of respect for existing practice, we permit people to continue to wear only white threads as well.

Appendix: How to tie Tekhelet

There are two questions that arise in the tying of tekhelet. First, how many threads are to be worn of tekhelet? And second, in what way are they to be tied.

How Many Threads

There are three positions on this question. Rashi and Tosfot on Menackot 39a hold that one should have two white threads and two blue threads. Rambam by contrast teaches that only one half of one thread need be tekhelet. Raavad, commenting on Rambam, disagrees and holds that one full thread must be blue.

I advise against Rashi and Tosfot because they may be requiring us to wear too much tekhelet. That is, the thread of blue ought be singular and provide a contrast rather than a duad. Further, this method is significantly more expensive than either Rambam or

Raavad because a person needs 2 to 4 times as much tekhelet dye. However, someone who prefers this method deserves only praise.

The Vilna Gaon followed the position of the Raavad. We hold either Rambam or Raavad to fulfill the mitzvah, but prefer to follow the Raavad when possible.

As a result I suggest one full thread be blue.

How to Tie

There are several methods of tying, all halakhically acceptable. I will offer only the methods that assume using either Raavad or Rambam tekhelet, ie one full blue thread or one half blue thread.

Method 1: Tie a double knot. Now make 3 blue turns followed by 3 white turns followed by 3 blue turns. Tie a second double knot and tie 3 white followed by 3 blue followed by 3 white. Tie a third double knot. Now tie 3 blue, followed by 3 white, followed by 3 blue, followed by 3 white, and a final double knot. This follows the practice of Sefer HaHinuch.

Method 2: Maimonides in Hilchot Tzitzit 1:7 suggests a different method. Tie one double knot that begins with the white thread. Now make 3 blue turns followed by 3 white turns. Repeat 11 times, for a total of 12 blue and 12 white turns. Make a third double knot that ends with a white thread.

Method 3: Combining the practice of the 7, 8, 11, 13 method of tying common among contemporary Ashkenazi Jews with tekhelet. In this method, the tekhelet thread becomes the "pointer," the thread used to wrap each tie. Make a double knot. Now take the tekhelet string and make 7 windings. Make a second double knot. Now make 8 windings with the tekhelet string followed by a third double knot. Now make 11 windings with the tekhelet and a fourth double knot. Finally, make 13 windings with the tekhelet string and a final double knot.