

## A response to Dr. Singer's review of *murex Trunculus* as the source of *tekhelet*

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I would like to thank Dr. Singer and Rabbi Cohen for allowing us to respond to the article, “*Understanding the Criteria for the Chilazon*.” The primary goal of the P’Til Tekhelet Foundation is to encourage and promote interest in the topic of *Tekhelet*. Dr. Singer’s article would probably never have been published in a contemporary *halachik* journal a few years ago. We would certainly take this as an indication that the awareness within the *halachik* community has grown, and that the perception of *tekhelet* as an issue to be addressed is taking root within widening circles of Torah debate, and for that we are grateful.

I would like to divide my response into two parts. The first will attempt to examine Dr. Singer’s objections one by one and provide our understanding of each point. The second part will focus on the more general issue of which criteria are actually the most critical in determining whether or not a certain *tekhelet* is kosher. For this, I would primarily rely on the Torah giants of past generations, and in particular, the objections that were raised by them against the Radzyner’s proposed *tekhelet*.

### Objections raised by Dr. Singer

Dr. Singer makes a sweeping statement at the beginning of his article that cannot go unchallenged. He states that “the strongest criteria for identifying the *chilazon* come from the *Gemara Menachot*” and specifically from the *Braita* found in *Menachot* 44a. This assertion is very difficult to reconcile with the fact that most *Rishonim*, in their discussion of the topic, do not quote this *Braita*. Both the *Rif* and the *Rosh*, who quote many other statements about *tekhelet* do not mention these criteria at all. Both the *Rambam* and the *Smag* selectively choose from among the criteria in the *Braita*, ignore one of those criteria (that it rises once in seventy years), and add or alter the other *simanim*. The *Maharil*, when stressing how easy it should be to reintroduce *tekhelet* based on finding the *chilazon*, refers to the *simanim* brought in the *Smag*, and not those of the *Braita*. Clearly the *Rishonim* did not feel bound by the criteria of the *Braita*. Nevertheless, let us examine the arguments in detail.

#### 1. The *murex Trunculus* is not the color of the sea.

First of all, I do not find Dr. Singer’s assertion, that the term *gufo* means the soft body of the mollusk, compelling. The *Braita* seems to be giving instructions to the fishermen as to what they should be looking for. It would therefore make most sense to describe the outward appearance of the organism and not something that would require time-consuming procedures (breaking open the shell and extracting the snail, then inspecting the color of the body). It is precisely that description of the *chilazon in situ* that we would expect, including sea-fouling. The *murex Trunculus* snail has a greenish color when it is alive in the ocean. Anyone who has seen it underwater is struck by its camouflage and resemblance to the sea. This fact is a perfect explanation of the term “*domeh l’yam*.”

Furthermore, the word “*domeh*” is problematical. When something is identical in a property, the *Gemara* knows how to say that explicitly. For example, the color of *tekhelet* is identical to the color of *kala ilan*. [The term \*domeh\* is not used there. And so, the \*Chacham Zvi\* \(responsum #56\) explains that the word \*domeh\* is only to be understood in a minimalist sense.](#)

In general, some have suggested that the entire *braita* is justifying the high cost of *tekhelet* (and not only the last characteristic). The fact that the snail resembles its surroundings would then explain why it is so difficult to obtain - since it would require highly trained fishermen or divers to search for it. This would make sense only if the outward appearance of the snail resembled the sea; the color of the hidden body would be irrelevant.

#### 2. The *murex Trunculus* is not a fish.

Sea snails are *halachically* fish. The opinion of the *Rishonim*, and the *Rambam* in some places<sup>1</sup> is that all sea creatures are fish. Furthermore, in *Hilchot Ma’achalot Asurot*<sup>2</sup> where the *Rambam* distinguishes between sea animals, fish, and sea *sh’ratzim*, shellfish fit in to the more focused subdivision of fish. The

examples he gives of sea animals are all larger creatures that have limbs for leaving the water (seal, frog, sirens); the *sh'ratzim* are the likes of worms and leeches. Sea snails do not fit either of these—they are clearly fish<sup>3</sup>.

And so they were called for centuries. Oxford Dictionary in the first entry under Fish defines it:

In popular language, any animal living exclusively in the water; primarily denoting vertebrate animals provided with fins and destitute of limbs; but extended to include various cetaceans, crustaceans, molluscs, etc. In modern scientific language (to which popular usage now tends to approximate) restricted to a class of vertebrate animals....”

After the definition there is a note: “Except in the compound shell-fish, the word is no longer commonly applied in educated use to invertebrate animals.” To say that *murex/chilazon* is not a fish, is an anachronism.

### 3. The *murex* does not have a 70 year cycle

Both the *Radzyner* and Rav Herzog dealt with this problem and did not feel that it was a sufficient reason to disqualify their candidates for the chilazon. The actual number of years varies from source to source. As previously mentioned, the *Rambam* does not bring it down when citing the *braita*. As Rav Herzog himself puts it, ““Science knows nothing of such a septuagenarian ‘appearance’ of any of the denizens of the sea.”<sup>4</sup> Rav Herzog and the *Radzyner* suggest that the cycle refers to periods of greater or lesser availability or accessibility, but that the animal itself is always obtainable.

Though I cannot point to any intrinsic characteristic of the *murex* that would explain this cyclic property, the archeological evidence may offer a clue. At the sites where ancient dye installations have been found, the crushed shells were often used as part of the walls of adjacent buildings. (It is not clear if this was to strengthen the matrix of the material, or as an adornment.) One finds that the size of the snails decreased over time. That fact indicates that the snails suffered from over fishing, and that they became increasingly hard to obtain over time. This extrinsic feature might explain the periodicity, that due to over fishing, the *murex* population would need time to replenish itself before a new expedition could reasonably hope to procure a sufficient amount.

Interestingly, the *Rambam* replaces this criteria with the phrase, “and it is found in the salty sea”, which most interpret as the Mediterranean. Perhaps the *Rambam* understood the phrase, “and it comes up once in seventy years,” in terms of its compliment. If you can find it on land very infrequently, then the rest of the time it lives in the sea.

### 4. The amount of dye in *murex* is too minute.

How minute is too minute? Approximately two tons of snails will provide enough dye for ten thousand sets of *tsitsit*. A small village in Greece might consume that amount for snacks in one week. Is that a lot or a little?

### 5. The equivalence of *murex tekhelet* with *kala ilan* - indigo

As I stated in my introduction, our primary *halachic* guides for any discussion of *tekhelet* are Rav Gershon Henokh Liener and Rav Herzog. Both of them are unequivocal in their assertion that *tekhelet* was the color of the mid-day sky. Rav Herzog clearly identified the color of *tekhelet* as identical to indigo and claims that this is also the opinion of the *Rambam*<sup>5</sup>.

Furthermore, both the *Radzyner* and Rav Herzog state that if one finds a candidate for the chilazon that satisfies these two criteria - that the color of the dye is sky-blue, and that its dye is fast and strong - **then that organism must be acceptable as a source for tekhelet**. To quote the *Radzner*:

If after searching, our hands will obtain the blood [secretion] of any kind of *chilazon* from which we may dye a color similar to *tekhelet*, a dye that retains its beauty and does not change, we will surely be able to fulfill the *mitzvah* of *tekhelet* without any doubt.<sup>6</sup> (sefuny, page 14, 1999 edition)

Both Rav Herzog and the *Radzyner* offer the same line of proof for this assertion. If there is another *chilazon* that satisfies these criteria, but is not kosher for *tekhelet*, then why would the Talmud not warn us regarding its use? Either that species is also kosher, or there is only one species in the world (or in the Mediterranean) that satisfies those criteria.<sup>7</sup> *Murex trunculus* provides a dye which is the color of *tekhelet*. Its dye is among the fastest dyes that exist. It was well known throughout the ancient world and is found off the coast of Israel. There can be no doubt, then, that according to Rav Herzog and the *Radzyner*, this species must be a kosher source for *tekhelet*.

#### 6. The chemical tests to determine true *tekhelet*.

I don't think that anyone completely understands the chemical tests brought down by the *Gemara* and the *Rambam* to distinguish between *tekhelet* and *kala ilan*. One thing is clear though; a sample subjected to the described procedures that does not fade, passes the *tekhelet* test. We have tested *tekhelet* dyed with *murex* according to the analysis described by the *Rambam*, and it did not fade. Therefore, there is no challenge that arises from this criterion to *murex tekhelet*.

The fact is, however, that indigo dyed wool also passed the chemical tests. Let me reiterate that this is not a problem as far as *murex tekhelet* is concerned, but rather an academic problem in understanding the *Rambam* and the *Gemara*. It should be noted that not everyone in the *Gemara* accepts the validity of the tests and there are opinions that no test can distinguish between *tekhelet* and *kala ilan* (*tekhelet eyn lah bedikah*<sup>8</sup>). I have proposed that although there may be no difference molecularly between *tekhelet* and *kala ilan*, and therefore according to the methods that we currently use to dye wool, there is no discernible difference in quality between the two, this historically was not always the case. When dyeing according to natural methods in the ancient world, *tekhelet* was dyed in a completely different manner than indigo. The former was fermented together with the meat from the snail. Current research by John Edmonds in England has shown that bacteria present in the snail meat plays an active part in the reduction of the dye. Indigo was reduced in an entirely different manner. It may therefore be the case that the subsequent quality and fastness of wool dyed with *tekhelet* according to the method employed in vat dyeing with snails, would have differed from that of *kala ilan*. Prof. Roald Hoffman has told me that he finds this proposition to be plausible.

#### 7. *Tekhelet* comes from a live *chilazon*.

We consider this to be a powerful proof in favor of *Trunculus* as *chilazon*. The enzyme required for dye formation quickly decomposes upon the death of the snail, and so the glands that hold the dye precursor must be crushed while the snail is alive or soon after. In experiments, we have seen that as soon as two hours after death, the quality of the dye is severely degraded. Dr. Singer's assertion that "the *Gemara* is speaking not of a few hours, but mere moments after death" is arbitrary. That assertion is even more implausible considering that Pliny and Aristotle employ the same terminology pertaining specifically to the *murex*.

#### 8. Equating *tekhelet* with *purpura*.

The *Chavot Ya'ir* in his *M'kor Chayim*<sup>9</sup> states clearly that the *chilazon* used for dyeing *tekhelet* is the *purpur*. The *Shiltei haGiborim* also states explicitly that it's the *purpura*<sup>10</sup>, the *Musaf la'Aruch* defines *Purpura* as the "Greek and Latin word for a garment of *tekhelet*", *Midrash haGadol* from Yemen<sup>11</sup> quotes Rav Chiya as saying, "the *purpura* of the kings is made out of *tekhelet*"; and even the *Aruch* himself suggests that the word "Tyrian" (apparently Tyrian purple) is Latin and Greek for the color *tekhelet*. The *Ramban*<sup>12</sup> also says that in his time only the king of the nations (i.e. the Emperor) was allowed to wear *tekhelet*, thus equating it with *purpura*. The *Radzyner* Rebbe himself notes<sup>13</sup> that the ancient chroniclers frequently mention *tekhelet* as a most precious dyestuff, perfected in Tyre. Obviously, he too believed *tekhelet* was *purpura*.

Let us not forget the fact that *tekhelet* has been lost for 1,300 years and therefore much of what has been written is based on assumptions and conjecture. It is highly doubtful that any and every statement regarding

*tekhelet* or the *chilazon* will suitably apply to any candidate. Nevertheless, it is our opinion that the *murex trunculus* fits the description of *chazal* in an overwhelming majority of instances.

### **Criteria for determining kosher tekhelet.**

There are numerous descriptions found throughout the Talmud, Midrashim, Zohar and other sources regarding *tekhelet* and the *chilazon*. It is essentially impossible to reconcile all of those sources. For example, the *Gemara* asserts that the *chilazon* is found in the Mediterranean, the Zohar claims that it is found in the Kinneret, while the *Rambam* states that it is to be found in the “*yam hamelach*.” Needless to say, there is no species that lives in all three habitats. A distinction must be made between *aggadic* statements relating to *tekhelet* and *halachik* statements. As with every issue in Jewish thought, we must strive to understand the *aggadic* material, but we are bound in deed by the *halachik* data. The *Gemara* states that the *chilazon* and proficiency in *tekhelet* dyeing was a special gift to the tribe of Zevulun. Would one require a certificate of *yichus* showing descent from that tribe before accepting *tekhelet* from a certain dyer? In this case, the “criterion” lies clearly within the *aggadic* realm, but in other cases the distinction might be less obvious.

What then are the criteria for *tekhelet* that are certainly *halachik*? We can know for sure that if some other *halacha* is based on a statement regarding *tekhelet* or the *chilazon*, then that statement has *halachik* validity. I can think of four or maybe five such statements.

1. ***Tekhelet is the color of Kala Ilan.***

All of the laws regarding *kala ilan* are based on this fact including the *sugyot* in *Bava Metzia* (61b) and *Menachot* (40a and 43a). The *halachot* of finding anonymous *tekhelet* in the street (*Eruvin* 96b) (according to the interpretation of most *Rishonim*) are based on this as well.

*Tekhelet* obtained from *murex Trunculus* is identical in color to *kala ilan* which is indigo.

2. ***Tekhelet is a fast dye that does not fade.***

The *Gemara* bases its chemical tests on this fact (*Menachot* 43a) - “*lo ifrid chazute, keshayrah* - if it does not change its appearance, it is kosher [for *tekhelet*].” The *Rambam* says this explicitly “*tzviyah yeduah sheomedet b'yafya* - a dye which is known to be steadfast in its beauty” (*HilchotTisitsit*, 2:1).

*Murex tekhelet* has been tested by independent fabric inspectors at the Shenkar College of Fibers and received excellent marks for fastness. I can personally testify to my own *tekhelet*, worn every day for the past ten years, that has not faded or changed color at all.

3. ***Tekhelet dyes on wool, but does not take to other fabrics.***

The well-known *halachik* principle of “*assay docheh lo'tassay* - a positive commandment takes precedence over a negative commandment” is based on the fact that the *tekhelet* dye adheres to wool but not to linen (*Yevamot* 4b - “*tekhelet amra hu - tekhelet* is [dyed] wool”).

*Murex tekhelet* binds exceedingly tight to wool, but not to cotton or synthetic fibers. Common blue jeans are indigo dyed on cotton, and they fade quite easily.

4. ***The dye from the Chilazon is more potent when taken from a freshly killed chilazon – but one must kill the animal in order to extract the dye.***

The *Gemara* in *Shabbat* (75a) discusses this and bases one of the fundamental principles of *hilchot shabbat* on this fact, namely *p'sik reisha d'lo nicha lei*- an inevitable act [lit. cutting off a head] that is undesirable.

As mentioned previously, the enzymes responsible for transforming the precursor of the dye into actual dye upon exposure to oxygen, do not survive long after the death of the snail. Within a few short hours after death, the *murex* can no longer be used for dyeing.

5. ***That tekhelet was not “hidden” until the days of Mashiach, but rather can be obtained at any time.***  
(As opposed to the position attributed to the AR”I *Hakadosh*)

The *Maharil*<sup>14</sup> rules that even though *tekhelet* is no longer available, one is still prohibited from wearing a linen *beggad* for *tsitsit*. This is because *tekhelet* is “easily available” and one need only find the proper *chilazon* in order to reinstate the *mitzvah* of *tekhelet*. As mentioned, this goes against the position of the AR"l, but I have not seen anyone who argues with the *Maharil* in practical terms and allows linen *beggadim* for *tsitsit*. That would be a necessary *halachik* implication based on the ARI's position.

I would like to point out two sources that are not commonly referred to in discussions regarding the criteria for *tekhelet*, or specific objections to a particular candidate for kosher *tekhelet*. Both were written in the early 1890's as critiques of the Radzyner's *tekhelet*. The first is an article called "*Tekhelet me'Iyay Elisha*" by Mordechai Rabinovits and the second is a book called "*P'til Tekhelet*" by Hillel Meshil Gelbshtein. Both of these works discuss the various sources and measure the Radzyner's *tekhelet* against them. Both are highly critical of the Radzyner's *tekhelet*. Although numerous challenges to the Radzyner's *tekhelet* are raised, the most forceful objections are based on the fact that Radzyn *tekhelet* did not meet the criteria that I have enumerated as "*halachik*". The authors of those works claim that Radzyn *tekhelet* is not the color of the sky, that it fades when washed with soap, and that the material from the dye can be obtained from dead *Sepia*, not only from live ones. According to these criteria, *murex tekhelet* would indeed be acceptable.

It is our hope that these and other issues relating to *tekhelet*, to the identification of the *murex Trunculus* as the *chilazon*, as well as the investigation of other candidates, will continue to spark discussion within the walls of *batei midrash* all over the world. Any argument that is for the sake of Heaven has great merit and will serve to unite *klal yisrael* in its search for truth and proper *kiyum hamitzvot*.

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<sup>1</sup> See *Hilchot Tumat haMet* 6,1 and compare to *Hil. Keilim* 1, 3.

<sup>2</sup> 2, 12.

<sup>3</sup> *LT*, 126-36.

<sup>4</sup> Herzog, *The Royal Purple*, page 69.

<sup>5</sup> *Ibid*, page 94.

<sup>6</sup> *Sefuney T'muney Chol*, page 14, 1999 edition

<sup>7</sup> Herzog, *ibid*, page 73

<sup>8</sup> *Menachot* 42b.

<sup>9</sup> 18, 2.

<sup>10</sup> Ch. 79; see *Lulaot Hatechelet*, Shlomo Taitelbaum, *P'Til Tekhelet*, Jerusalem, 2000 page 100 for more information about this work.

<sup>11</sup> *Bamidbar* 4, 5.

<sup>12</sup> *Sh'mot* 28:2.

<sup>13</sup> *P'til Tekhelet*, Introduction.

<sup>14</sup> *Shu"t Maharil HaChadashot* (M'chon Yerushalayim), #5, 2.