

We 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 *halakhic* journal a few years ago. We would certainly take this as an indication that the awareness within the *halakhic* 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.

We would like to divide our response into two parts. The first part will attempt to examine Dr. Singer’s main 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 the *halakhic* acceptability of a specific *tekhelet* dye. For this, we will primarily rely on the Torah authorities of past generations, and in particular, the objections that were raised by them against the Radzyner Rebbe’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 This assertion is very difficult to reconcile with the fact that most *rishonim*, in their discussion of the topic, do not quote this *braita*.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 (i.e., that it rises once in seventy years), and add to 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 take the criteria of the *braita* at face value. They treat these statements as general descriptive identifiers and not as distinct and essential characteristics of the *chilazon*. With this in mind, let us examine the arguments in detail.

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

First of all, Dr. Singer’s assertion, that the term *gufo* means the soft body of the mollusc, is not compelling. As mentioned, the *braita* provides general descriptive information regarding the *chilazon*. It would make most sense to describe the outward appearance of the organism before going on to its internal appearance, especially given that internal examination requires painstaking procedures (e.g., carefully breaking open the shell and extracting the snail). Moreover, the general description would most naturally be that of the *chilazon in situ* – covered in its characteristic sea-fouling (and not after it has been assiduously polished). [\[2\]](#) The *murex Trunculus* snail has a greenish color when it is alive in the ocean, and 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*.” Indeed, this interpretation is not new; the commentary on the *Sefer Yitzirah* attributed to the Raavad similarly understands this passage. [\[3\]](#)

Furthermore, the word “*domeh*” implies similarity and not absolute equivalence. When something is identical in property, the *Gemara* states it explicitly. For example, when the *Gemara* explains that the color of *tekhelet* is identical to the color of *kala ilan*, it states that only Hashem can distinguish between the two [\[4\]](#). The term *domeh* is not used. The *Chacham Zvi* [\[5\]](#) states clearly that the term *domeh* implies a certain “similarity” in a property and nothing more.

Some have even suggested that all the criteria enumerated in the *braita* come to explain the conclusion, namely why *tekhelet* is expensive. [\[6\]](#) 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 *halakhically* fish. The opinion of the *rishonim*, including the Rambam in some places [\[7\]](#) is that all sea creatures are fish. Furthermore, in *Hilchot Ma’achalot Asurot* [\[8\]](#) 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— and thus fall into the remaining category of “fish”. [\[9\]](#)

The 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. As such, the *murex* mollusc fits neatly into the description “*briato domeh l’dag*”.

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*. As previously mentioned, the Rambam does not bring it 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.”^[10] Rav Herzog and the Radzyner suggest that the cycle mentioned refers to periods of greater or lesser availability or accessibility, but that the animal itself is always obtainable^[11].

Though no intrinsic characteristic of the *murex* 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 decreases over time. This 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 – namely, if you can find it on land very infrequently, then the rest of the time it is found in the sea.

4. The amount of dye in each *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 consumes that amount for snacks in one week. Is that too much or too little?

5. The chemical tests to determine true *tekhelet*.

Based on discussions with scientists and Talmudists it is clear that no one completely understands the chemical tests brought by the *Gemara*, and interpreted by the Rambam and Rashi, 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 both the Rambam and by Rashi, and it did not fade. Therefore, there is no challenge that arises from this criterion to *murex tekhelet*.

The fact is, however, that indigo (*kala ilan*) dyed wool also passed the chemical tests. To reiterate, this is not a problem as far as *murex tekhelet* is concerned, but rather an academic problem in understanding the Rambam and the *Gemara*. I personally have proposed that although there may be no difference molecularly between the two, and therefore according to the methods currently used to dye wool, there is no discernible difference in quality between them, historically, this 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. On the other hand, indigo was chemically reduced in an entirely different manner. Consequently, it is quite reasonable that the 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*. This may have been the basis for tests that attempted to distinguish between the two. Nobel Chemist Prof. Roald Hoffman has told me that he finds this proposition to be plausible.

It should also be stressed that regardless of one's opinion as to the efficacy of these tests in differentiating between *tekhelet* and *kala ilan*, one incontrovertible fact must be understood: *tekhelet* and *kala ilan* are visually indistinguishable.^[12] And since the blue dye from the *murex* is molecularly equivalent (and needless to say – visually equivalent) to *kala ilan* dye, the *murex tekhelet* is undoubtedly the exact color of the *tekhelet* of

chazal. This fact is a sufficient condition for the determination that *murex tekhelet* is kosher - even if there may be another *tekhelet* which would also be kosher. This will be explained more fully in the discussion of argument number 8.

6. *Tekhelet* comes from a live *chilazon*.

This is one of the more powerful proofs supporting the *murex* as the *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 totally arbitrary. That assertion is even more implausible considering that this property is mentioned by both Pliny and Aristotle specifically regarding the *murex*. Since the *murex* loses its dye quality a few hours after its death, and those scholars express that fact by saying that the dye must be obtained from live snails, it follows that the *Gemara's* use of the same terminology would certainly sustain a two hour *post mortem* limit.

7. Equating *tekhelet* with *purpura* and the color of *purpura*.

The *Chavot Ya'ir* in his *M'kor Chayim*^[13] states clearly that the *chilazon* used for dyeing *tekhelet* is the *purpur*. The *Shiltei haGiborim* also states explicitly that it is the *purpura*^[14]. The *Musaf la'Aruch* defines *purpura* as the "Greek and Latin word for a garment of *tekhelet*". The *Midrash haGadol* from Yemen^[15] quotes Rav Chiya as saying, "the *purpura* of the kings is made out of *tekhelet*", and the *Aruch* suggests that the word "Tyrian" (apparently Tyrian purple) is Latin and Greek for the color *tekhelet*. The *Ramban*^[16] 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 notes^[17] that the ancient chroniclers frequently mention *tekhelet* as a most precious dyestuff, perfected in Tyre. Obviously, he too believed *tekhelet* was *purpura*.

The other points raised by Dr. Singer regarding the identification of *purpura* with *tekhelet* are simply not accurate. Vitruvius specifically states that one of the shades that can be obtained from the *purpura* is blue (*lividum*).^[18] Moreover, we have noticed that one can obtain a blue color from *murex Trunculus* without even exposing it to sunlight – simply by steaming the wool immediately after the dyeing. It is hard to believe that we amateurs, who have been dyeing for less than a decade, would know more than the ancient dyers who made their livelihood working with these dyes for more than 2,000 years.

Furthermore, one would not expect to find anything but purple archeological stains since while the glands are being stored for dyeing, and during the fermentation process, the vat color is purple. Only during the very short dyeing stage itself (and possibly, not until after the dye process was completed, if steaming was used), would the dye turn blue.

Lastly, Dr. Singer's question as to why the ancients would have wanted to dye blue with *murex* when indigo was more readily available is anachronistic, since *murex* dyeing in the Mediterranean dates back to the time of Avraham whereas indigo reached the region only 1,500 years later. (Though ancient Egyptians used a blue coloring for eye makeup, there was no blue dyeing of garments with any material other than the *murex*.)

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

As stated previously in the introduction, the primary *halakhic* guides for any discussion of *tekhelet* are Rav Gershon Henokh Leiner 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*^[19]. The *Gemara* itself explains that only Hashem can distinguish between *tekhelet* and *kala ilan* (i.e., indigo).^[20]

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 kosher source for *tekhelet***. To quote the Radzyner:

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.^[21]

Both Rav Herzog and the Radzyner offer the same line of compelling proof for this assertion. If there were another *chilazon* that satisfies these criteria, but is not kosher for *tekhelet*, then why would the *Gemara* not warn us regarding its use? The *Gemara* cautions us only of *kala ilan*, a plant substitute for *tekhelet*, but never mentions any alternative sea creature that might mistakenly be used for *tekhelet*. Either that hypothetical species is also kosher, or there is only one species in the world (or in the Mediterranean) that satisfies both those criteria.^[22] *Murex Trunculus* provides a dye which is the color of *tekhelet*. Its dye is among the fastest dyes that exist.^[23] 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*.^[24]

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 each 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 descriptions of *chazal* in an overwhelming majority of instances.

Criteria for determining kosher tekhelet.

There are numerous descriptions found throughout the *Gemara*, Midrash, Zohar and other Judaic sources regarding *tekhelet* and the *chilazon*. In order to begin to apply them it is important to understand, first and foremost, that it is essentially impossible to reconcile all of those sources with any candidate, or, for that matter, with each other. For example, the *Gemara* asserts that the *chilazon* is found in the Mediterranean^[25], the Zohar claims that it is found in the Kinneret^[26], while the Rambam states that it is to be found in the “*yam hamelach*.”^[27] Needless to say, there is no species that lives in all three habitats.

Secondly, it is essential to distinguish between *aggadic* statements versus *halakhic* statements. For as with every issue in Jewish thought, though we must strive to understand the *aggadic* material, we are bound in deed by the *halakhic* instruction. One method to determine if a statement is *halakhic* in nature is to find its use as the basis for an actual *halacha*. Conversely, if a statement is never used in a formal *halacha*, it quite often remains in the realm of a non-binding *aggadic* statement. For example, the *Gemara* relates that the *chilazon* and the proficiency in *tekhelet* dyeing were a special gift to the tribe of Zevulun. Nevertheless no certificate of *yichus* proving descent from that tribe is required before accepting *tekhelet* from a dyer! In this case, the “criterion” lies clearly within the *aggadic* realm.

On the other hand, the following are a number of statements relating to *tekhelet* and the *chilazon* which do find their way in to formal *halacha*, and these must be related to with due rigor.

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).

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

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 states this explicitly “*tzviyah yeduah sheomedet b'yafya* - a dye which is known to be steadfast in its beauty” (*Hilchot Tzitsit*, 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-know *halakhic* 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”).^[28]

Murex tekhelet binds exceedingly tight to wool, but not to cotton or synthetic fibers.

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) 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. Consequently, within a few hours after death, the *murex* can no longer be used for dyeing.

5. ***Tekhelet was not “hidden” until the days of Mashiach, but rather can be obtained at any time***

The *Maharil*^[29] rules that even though *tekhelet* is no longer available, one is still prohibited from wearing a linen *begged* 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*. To the best of our knowledge, there is no *posek* who argues with the *Maharil* in practical terms and allows a linen *begged* for *tsitsit*.

Finally, it is instructive to mention two not commonly referred to sources which provide an important perspective on this discussions. Both were written in the early 1890's as critiques of the Radzyner's *tekhelet*. The first is an article entitled “*Tekhelet me'Iyay Elisha*” by Mordechai Rabinovits and the second is a book called “*P'til Tekhelet*” by Hillel Meshil Gelbshtein^[30]. 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 “*halakhic*” criteria enumerated above. The authors of these works contend that (a) Radzyn *tekhelet* is not the color of the sky, (b) that it fades when washed with soap, and (c) that the material from the dye can obtained from dead *sepia Officinalis*, (and not exclusively from live organisms). On the other hand, as has been demonstrated herein, *murex tekhelet* would indeed be acceptable precisely according to all these criteria.

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*.

[1] I would like to thank the members of P'Til Tekhelet for their comments and especially Rav Shlomo Taitelbaum and Mois Navon for helping to prepare much of this response. Rav Taitelbaum's recent book, *Lulaot Tekhelet* already dealt with many of these issues, and is available from P'til Tekhelet (info@tekhelet.com). A database of articles dealing with *tekhelet* can be found at www.tekhelet.com.

[2] Dr. Yisrael Ziderman, “*Reinstitution of the Mitzvah of Tekhelet in Tsitsit*” (Hebrew), *Techumin*, Vol. 9 (1988), p. 430.

[3] Commentary on *Sefer Yitzirah* attributed to the Raavad, Introduction, *netiv* 8

[4] Bava Metzia, 61b.

[5] *Shaalot U'tshuvot Chacham Tzvi*, responsum 56

[6] Y. Rock, “Renewal of *Tekhelet* and Issues on *Tsitsit* and *Tekhelet*” (Hebrew), *Techumin*, Vol. 16 (website expanded version), p.15, n.57.

[7] See *Hilchot Tumat haMet* 6,1 and compare to *Hil. Keilim* 1, 3.

[8] *Hilchot Ma’achalot Asurot* 2, 12.

[9] Shlomoh Taitelbaum, *Lulaot Tekhelet*, P'Til Tekhelet, Jerusalem, 2000, pp. 126-36.

[10] Herzog, *The Royal Purple*, page 69.

[11] I should point out that there are those who explain that this is referring to a supernatural exodus onto land (Chida, Ptach Aynayim, Menachot 44a).

[12] *ibid.*

[13] *Chavot Ya’ir* in his *M’kor Chayim* 18, 2.

[14] Ch. 79; see *Lulaot Tekhelet*, page 100 for more information about this work.

[15] *Bemidbar* 4, 5.

[16] *Sh’mot* 28:2.

[17] *P’til Tekhelet*, Introduction.

[18] *Vitruvius*, De Architectura (ed. H. L. Jones), Loeb Classical Library, Cambridge, London 1930) Book VII, c. VII-XIV, p. 113-129

[19] *Ibid*, page 94.

[20] Bava Metzia, 61b.

[21] *Sefunei T’munei Chol*, page 14, 1999 edition

[22] Herzog, *ibid*, page 73

[23] Personal correspondence with the late Prof. Otto Elsner, professor of Ancient Dye Chemistry at the Shenkar College of Fibers.

[24] Though Rav Herzog studied the *murex Trunculus*, he provisionally rejected it; primarily because the process for obtaining blue dye visually equivalent to *kala ilan* was not then known. The process was not discovered until 1980 by Professor Otto Elsner of the Shenkar College of Fibers. I should also point out that there is no other species other than the *muricae* currently known that produces a dye similar in color to indigo and neither is there any archeological evidence for other species being used in the ancient world for dyeing. In order to assume that the *chilazon* of *chazal* is different than the *murex*, one would need to accept both the fact that knowledge of that organism eludes modern science as well as the fact that the detailed archeological survey of the Mediterranean has not uncovered any hint of such an animal.

[25] Shabbat 16a.

[26] Zohar, II, 48b.

[27] *Hilchot Tsitsit*, 2;2

[28] Rashi does not follow this reasoning. On the other hand, the Yerushalmi Kelim (9:1) says “*Ma pishtim k’briata af tsemer k’briato*” just as linen remains its own color, so to wool (only can become *tamei nigei b’gadim*) in its natural color (and not dyed).” We see from there that only wool is dyed, not linen.

[29] *Shu”t Maharil HaChadashot* (M’chon Yerushalayim), #5, 2.

[30] Hillel Meshil Gelbshtein, Introduction to *P’til Tekhelet*, printed in *Abir Mishkenot Yaakov* by the same author. The Gelbshtein family is currently reprinting the entire book which should be available by January, 2001.