

# Substituting Synthetic Dye for *Hilazon*: The Renewal of *Techelet*

by Rabbi Bezalel Naor

Over the past decade, great strides have been made in the research of *techelet*, the blue dye the Torah mandates be used in the *tzitzit*.<sup>1</sup> This renewed impetus enfolds all aspects of the subject – rabbinic, biological and chemical – and may even augur the practical implementation of *techelet* during our lifetimes. One of the most basic questions to be prompted by this inquiry is whether the traditional source of the blue dye, the *hilazon* (a type of snail), is a sine qua non in the eyes of the halacha, or may be dispensed with in our age of synthetic dyes. Must *techelet* be a dye made from *hilazon*, or must it only be the color of the dye made from *hilazon*? It is upon this problem that we shall focus our attention, leaving other aspects of the manifold discipline of *techelet* (or to use Rabbi Herzog's term, "Hebrew Porphyrology") for separate discussions.

At the outset, it would be appropriate to define the term *techelet* of the Torah. In all, three types of colored wool were used in the Tabernacle and sacerdotal vestments or *bigdey kehunah*: *techelet*, *argaman* and *tola'at shani*. The hyphenated *tola'at-shani* refers both to the color and the dyestuff. *Shani* is

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1. See B. Naor, *Ba-Yam Derekh* [„In the Sea - A Way„] (Jerusalem, 5744) pp. 98-104; Isaac Herzog, *The Royal Purple and the Biblical Blue* (Editor: Ehud Spanier, Jerusalem, 1987); Israel Ziderman, „*Le-hiddush mizvat techelet ba-sisit.*„ (“The Mizvah of Techelet..”) *Techumin* (5748) 9:423-446; Menahem Burstin, *Ha-Techelet* (Jerusalem, 5748).

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Instructor. Yeshivat Rabbenu Yitzchak Elchanon.

the color – scarlet. And *tola'at* is the worm or insect which is the source of that scarlet color. As Maimonides writes in *Mishneh Torah*: "*Tola'at* are the very red grains which resemble the seeds of carob; they are like sumac, and there is a worm or insect in each grain."<sup>2</sup> (The reference is to kermes, the source of the color "carmine.") *Argaman*, purple, on the other hand, refers strictly to a color designation and not to any specific dyestuff. Neither the Written nor the Oral Law stipulates the use of a specific dyestuff for *argaman*.<sup>3</sup> The question now arises, what is the status of *techelet*? Does *techelet* by definition include the dyestuff as well, as in the case of *tola'at-shani* (in this instance the dye being *hilazon*, a snail), or only the color (blue) as is the case with *argaman*? This is a difficult question and one which sparks controversy in halachic literature.

The Tosafot<sup>4</sup> understood that *techelet* is defined in terms of *hilazon*. The fourth century *amora*, Rav Shmuel bar Rav Yehudah, had described the actual dyeing of *techelet*: "We bring the blood of *hilazon* and chemicals, and throw them into the vat and boil them." Tosafot were puzzled at the thought that any extraneous matter other than *hilazon*, the snail itself, be used for *techelet*. "How is it possible to mix anything together with the *techelet*?!" Their answer is that the entire ensemble of *hilazon* together with the requisite chemicals is what the Torah refers to as *techelet*. It is apparent from this line of reasoning that for the Tosafot, the definition of *techelet* is not restricted to a color or appearance, but rather addresses the dyestuff itself. And in fact, we do find explicitly in the

2. *Hilchot Parah Adumah* 3:2.

3. See *Tosefta*, *Menahot* 9:6-7 and *Mishneh le-Melech*, *Hil. Klei ha-Mikdash* 8:13. Rabbi Herzog's (*Ibid.*, p. 56) explanation for the *Tosefta's* non-legislation of *argaman* is difficult to follow.

4. *Menachot* 42b, s.v. *we-samemanim*.

*Tosefta*<sup>5</sup> the law: "Techelet is valid only from *hilazon*; if *techelet* was produced other than from *hilazon*, it is invalid."

Given this definition of *techelet*, there would be no room for any discussion of a synthetic substitute for *hilazon*. However, several rabbis of the last century ostensibly found latitude for such an eventuality in the halachic definition Maimonides gives to *techelet*. In the beginning of the second chapter of *Hilchot Tzitzit*, Maimonides writes:

The *techelet* mentioned throughout the Torah is the wool dyed a toned-down blue. This is the appearance of the sky viewed against the sun where the sky is clear.

*Techelet* mentioned in *tzitzit*, must be dyed with a known dye whose beauty endures and does not change. If the *techelet* were not dyed in that manner, it is invalid for *tzitzit*, though it be the hue of heaven. For example, if it were dyed with *isatis* (woad) or indigo or other bluing dyestuffs, it is invalid for *tzitzit*.

Based on a precise analysis of this passage, certain rabbis<sup>6</sup> understood Maimonides to say that the Torah has no intrinsic concern for *hilazon*. The snail is only a means to an end, which is, a resilient and unfading color blue. Therefore, in his definition of *techelet*, Maimonides makes no mention of *hilazon*. Only later,<sup>7</sup> when he moves from the level of theory to the level of actual practice, does he talk of *hilazon*. In other

5. Ibid 9:6.

6. See R. Zevi Hirsch Kalischer, *Derishat Zion, Ma'amar Kadishin* (Mossad Harav Kook: Jerusalem, 5724) p. 137. Many years later, R. Yosef Dov Soloveitchik *shelita* of Boston would make the identical inference from Maimonides' phraseology in *Hilchot Tzitzit*. (Lecture notes by R. Herschel Schachter, published in *Mi-beit Midrasho shel Ha-Rav*, p. 68.) See also R. Yehiel Mikhel Tuckachinsky, 'Ir Ha-kodesh *Ve-ha-Mikdash V*, p.44, who pursues Rav Kalischer's line of reasoning.

7. *Hil. Tzitzit* 2:2.

words, Maimonides has provided us with a rationale for *hilazon*. *Hilazon* is not a law without a reason, but rather, tradition has specified *hilazon* for the reason that its color endures, where other dyestuffs – woad and indigo, for example – fade. But how does Maimonides know that this is the reason for *hilazon*?

It would appear<sup>8</sup> that Maimonides arrived at this understanding after studying the passage in Tractate *Menachot* (42b-43a) which details several chemical tests to ascertain that *tzitzit* have been dyed with authentic molluscan *techelet* and not with its cheap counterfeit, indigo or *kala-ilan*. In these tests, the genuine *techelet* survives, while its indigo counterfeit fades. Evidently Maimonides understood these tests as being more than a pure indicator. To his thinking, they provide the key to understanding why the halacha insisted on the molluscan dye over vegetable dyes, namely its superiority as a dyestuff, its permanent character. Maimonides' perception of *techelet's* specialty in terms of superior resilience would have been reinforced by consulting dyers of his time,<sup>9</sup> as well as classic works on the subject by Greek authors who universally characterize the molluscan purple as being superbly permanent.<sup>10</sup> In fact, in *Hilchot Tzitzit*, Maimonides does refer to conventional dyeing practice, "the way dyers do."

But once again, the question returns, why did the halacha concern itself that the color of *techelet* be immutable? What would be so wrong if the blue were not of an unchanging character? [For instance, we find no such stipulation regarding the black ink with which *sifrei torah*, *tefillin* and *mezuzot* are

8. See *Kesef Mishneh*, *ibid.*; R. Yisrael Lifschitz, *Tiferet Yisrael*, introduction to *Seder Mo'ed*; R. G.H. Leiner, *Ma'amar Sefunei Temunei Chol*, Second Argument (*ha-ta'anah ha-sheniyah*); and R. Hayyim Kanievsky, *Kiryat Melech* to Maimonides, *ibid.*

9. Cf. *Kesef Mishneh*, *Hil. Zizit* 2:2 s.v. *keitzad tzov'in*.

10. See R. Isaac Halevy Herzog, *ibid.*, p. 34.

written. With the passage of time, the ink does grow fainter, yet the halacha seems unperturbed in this regard.]

The Rebbe of Radzyn<sup>11</sup> suggested that this insistence on durability and permanence has something to do with the fact that the Torah employs the expression *kelil techelet*<sup>12</sup> or "whole techelet," but this suggestion is difficult to understand, for if such were the case, Maimonides would insist on the permanence of general *techelet*, as the expression *kelil techelet* occurs in the context of the *me'il* of the high priest, as well as the cover for the Tabernacle. But as we have seen, for Maimonides, permanence is a property of the special *techelet* of *tzitzit*, not that of the priestly garments<sup>13</sup> or Tabernacle).

However, it might be possible to contend, quite the contrary, that the tests to distinguish between *techelet* and *kala-ilan* or indigo, are exactly that, differential analyses, and no more. They are not the *raison d'être* of *hilazon*. *Hilazon* is a halacha, a hoary tradition without a reason. The imitations of *techelet* may not have been as inferior in quality as one generally imagines. The color of the fake *techelet* dyed with indigo which Professor Yadin discovered in the so-called Bar Kokhba

11. R. Gershon Hanoch Hench Leiner, *Ibid.*

12. *Ex. 28:31, 39:22, Num. 4:6*. See also *Menachot* 42b and *Tosafot*, *ibid.*, s.v. *mishum she-ne'emar kelil techelet*.

13. See *Tiferet Yisrael*, intro. to *Mishnah, Mo'ed*; R. Shelomo of Chelmo, *Merkevet ha-Mishneh, Hil Tzitzit* 2:1; R. Yehiel Mikhel Halevi Epstein, *'Aruch ha-Shulhan he-Aud, Hil. Klei ha-Mikdash* 28:9-11. [Also cf. R. Ya'akov Hazan of Londres' paraphrase of Maimonides, in *'Etz Hayyim* (Ed. Israel Brody, Mossad Harav Kook: Jerusalem, 5722).] All of the above sources reject the *Mishneh le-Melech's* contention (*Hil. Klei ha-Mikdash* 8:13) that Maimonides would require *hilazon* for the *techelet* of the priestly raiment as well. Though we now know that exactly that position was held by R. Abraham Maimonides in his *Commentary to Genesis and Exodus* (London, 5719), beg. *Terumah*, we are forced to conclude that the son's opinion in this matter is not that evinced by his illustrious father in *Hil. Tzitzit* 2:1.

caves survived all these thousands of years. There are examples of Coptic or Egyptian purple dyed with indigo which are almost as old and still holding their own. In the Talmud itself there is a contraindicative passage in *Bava Kamma* 93b which states that *kala-ilan* or indigo could not be removed by washing with soap. There is room for debate here as to the merits of molluscan *hilazon* versus vegetable indigo, but the point remains: It makes perfect sense to say that the reason indigo is invalid is because it is not from the *hilazon*, not because it cannot match the *hilazon* in quality.

Even if we were to accept Maimonides' rationale, in principle there is a problem here, and that is, Jewish law does not render juridic decisions based on reasons early codifiers – even the great Maimonides – have given to halachot.

Here, let me digress for a moment in order to provide an illustration. In the 1870s, a citizen of Jerusalem, R. Hillel Moshe Meshel Gelbstein attempted to reinstitute the mitzvah of *shemirat ha-mikdash*, ritual guarding of the Temple Mount by appointed Levites. In a lengthy responsum,<sup>14</sup> the Gaon of Sokhatchov, R. Avraham Bornstein, analyzed the problem from various perspectives: According to the reason for the mitzvah given by Maimonides,<sup>15</sup> namely, as a sign of respect to the Temple, it would not apply today. But according to the alternate explication of this commandment,<sup>16</sup> that we are to

14. *Avnei Nezer, Yoreh De'ah*, no. 449.

15. Commentary to Mishnah, *Tamid* 1:1; *Sefer ha-Mitzvot*, positive commandment 22; *Yad, Hil. Beit ha-Behirah* 8:1. In *Sefer ha-Mitzvot*, Maimonides cites as his source, the *Mechilta*. However, as R. Hayyim Heller pointed out in his edition of *Sefer ha-Mitzvot*, the quotation occurs nowhere in our version of *Mechilta*, but rather in *Sifre Zuta, Korah*. See also *Yalkut Shim'oni*, end chapt. 752 and *Kesef Mishneh, Hil. Beit ha-Behirah*, *ibid*.

16. See *Numbers Rabbah* 3:12; Rashi, Num. 3:6; R. Elijah of Vilna's commentary to *Tamid* 1:1; paragraph 21 of R. Hillel Moshe Meshel

watch so as to prevent the entry of forbidden persons, the mitzvah is still applicable today.

The Assistant Rabbi of Jerusalem, R. Avraham David Rabinowitz-Teomim, (ADeReT) sought to question this entire approach which would make the *pesak halacha* subject to the various *ta'amei ha-mitzvah*. In response to Rabbi Gelbstein's query, he writes simply:

His honor has engaged in dialectic (*pilpul*) according to all the reasons. To my humble thinking, this was unnecessary. On the contrary, without any reason, why should the mitzvah of *shemirat ha-mikdash* be inferior... as it is a foregone conclusion in the entire Torah that we do not interpret reasons of the verse, at all (*lo darshinan ta'ama di-kerá kelal*). The Torah writes plainly here, so we must guard the Temple. Since even in the Temple's state of destruction, its name is yet upon it, from whence does one derive that we should be released from guarding it?!<sup>17</sup>

We might apply the ADeReT's logic to our own discussion of *hilazon*. The case for insisting on *hilazon* is both weaker and stronger than that for *shemirat ha-mikdash*. Weaker, because the Temple is a written commandment, whereas *hilazon* is but an oral tradition. Stronger, because the reasons the *Rishonim* give regarding *Shemirat ha-mikdash* are taken from ancient sources of *Chazal*, whereas Maimonides' rationale for *hilazon* occurs nowhere in the early sources of the Rabbis. This is one of many passages in *Mishneh Torah* where Maimonides provides

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Gelbstein's *she'elah* (query), *Mishkenot le-Abir Ya'akov* [Jerusalem, no date] 2f (no pagination); R. Hayyim Zimmerman, *Igra la-Yesharim* (Jerusalem, 1983) 2a.

17. Published in *Mishkenot le-Abir Ya'akov II* (R. Yisrael Dov Frumkin, publisher *Ha-Havazelet*: Jerusalem, 5654) 10a (incorrectly paginated 9a). See also R. Moshe Sternbuch, *Mo'adim u-Zemanim* 8:349 (p. 87). I am indebted to Rabbi Y.Y. Rominek *she-yihyeh* for the latter reference.

a rationale for a halacha. Later decisors felt in no way bound by these original rationales of Maimonides, the prime example being the *Tur's* reaction to Maimonides' rationale for not rounding the corners of the head nor marring the corners of the beard.<sup>18</sup>

Accepting Maimonides' rationale for *hilazon* as plausible is one thing; opting for leniency in the matter based on that rationale is quite another. Just as we are not exempted of the obligation to watch over the Temple Mount by the reason provided by Maimonides – a la ADeRet – so too we cannot be disencumbered of *hilazon* by the rationale provided by Maimonides. Furthermore, it is probable that Maimonides himself would not render a substitution of *hilazon* by a synthetic dye to be halachically permissible based on his rationale. (Just as the commentators on the *Tur* are quick to point out that Maimonides himself had no intention of his rationale impacting the laws of *hakafat ha-rosh* and *hashchatat ha-zakan*.)

By way of summary, a *posek* called upon to decide the permissibility of a synthetic substitute for the secretion of *hilazon*, finds in the early literature three germane sources: A) the Tosafot (*Menachot* 42b) who indisputably opine that *techelet* by definition means *hilazon*; B) the *Tosefta* (*Menachot* 9:6) which seems to disqualify any substance other than *hilazon* as the dyestuff of *techelet*; and C) Maimonides' ruling which may open the door for synthetic dyes capable of simulating both the appearance and durability of the molluscan dye.

Both sources B and C are open to interpretation. R. Gershon Hanoch Leiner<sup>19</sup> already pointed out that logically the *Tosefta* need not contradict Maimonides' definition of *techelet*. Rabbi Leiner felt the *Tosefta* itself should be read against the backdrop of Maimonides' rationale: "Techelet is valid only from *hilazon*,

18. See *Tur*, *Yoreh De'ah*, beg. chapter 181.

19. *Ma'amar Sefunei Temunei Chol, ha-ta'anah ha-sheniyah; Ma'amar Petil Techelet, sha'ar ha-teshuvah*, 5.



producer of a durable blue; if *techelet* was produced other than from the durable dye of *hilazon*, it is invalid." If we follow Rabbi Leiner's assertion, then the *Tosefta*, rather than contradicting Maimonides' statement, would actually serve as its source, coming as it does to invalidate less than permanent dyestuffs. The *Tosefta* could support such a reading if it were to occur in the context of the special *techelet* of *tzitzit*, which Maimonides singles out for durability. But, the *Tosefta* occurs within the context of the *bigdey kehunah* or sacerdotal vestments.<sup>20</sup> As the *bigdey kehunah* do not warrant *hilazon* in Maimonides' system, we must conclude that the *Tosefta* and Maimonides disagree.

Based on this and the fact that our own finding that the permissiveness of Maimonides is only alleged and may not be real (his rationale being consigned to the realm of *ta'amey ha-mitzvot*), I think it becomes clear, in terms of *pesak halacha*, that the actual *dam hilazon*, the snail secretion, remains a *sine qua non* for the practical reinstatement of *techelet*.

There is yet another method which *poskim* are known to adopt, and that is recourse to the later responsa literature of the *Acharonim*. The *kat ha-matirim*, or permissive party, includes Rabbis Zevi Hirsch Kalischer,<sup>21</sup> Yisrael Lifschitz,<sup>22</sup> Yehiel Mikhel Tuckachinsky,<sup>23</sup> and Joseph Baer Soloveichik

20. See R. Bezalel Hakohen of Vilna, *Reshit Bikkurim* II, 2 and R. Isaac Halevy Herzog, in R. Y.M. Tuckachinsky's *'Ir ha-Kodesh ve-ha-Mikdash* V, p. 56. The attempt by Rabbis Kalischer (*Derishat Zion* [Mossad Harav Kook, 5724] p. 170) and Tuckachinsky (*ibid.*, p. 45) to relocate the *Tosefta* in *hilchot tzitzit* is difficult.

21. *Derishat Zion, Ma'amar Kaddishin* (Mossad Harav Kook: Jerusalem, 5724) p. 137.

22. *Tiferet Yisrael*, introduction to *Seder Mo'ed*.

23. In *'Ir ha-Kodesh ve-ha-Mikdash*, vol. V, pp. 43-46, Rabbi Tuckachinsky pursues the line of Rabbi Kalischer.

(of Boston).<sup>24</sup> All these believed that a synthetic substitute for *hilazon* would be halachically permissible, provided it satisfied Maimonides' two conditions of sky-blue appearance and unfading durability. In the roster of the *kat ha-osrim*, or rejectionist party, would appear the names of Rabbis Akiva Eiger,<sup>25</sup> Bezalel Hakohen of Vilna,<sup>26</sup> David Friedman of Karlin,<sup>27</sup> and Yitzhak Schmelkes of Lemberg<sup>28</sup> (the last three basing their decision on the *Tosefta*).

Rabbi Herzog<sup>29</sup> expresses ambivalence, allowing synthetic *techelet* according to Maimonides' rationale for *hilazon*, but himself differing with Maimonides as to the halachic *raison d'etre* of *hilazon*.

Rabbi Gershon Hanoch Leiner of Radzyn<sup>30</sup> is of the opinion that *techelet*, though not necessarily from *hilazon* per se, must nevertheless be from a *ba'al chai*, an animate creature. The source for this allegation is a certain interpretation of the *Yerushalmi*.<sup>31</sup> Needless to say, contemporary synthetic dyes

24. *Shiur* delivered at Yeshivat R. Yitzchok Elchanon, New York, recorded by *talmidim*. See note 6 above.

25. Letter to his disciple R. Zevi Hirsch Kalischer, published in the latter's *Derishat Zion, Ma'amar Kaddishin* (Mossad Harav Kook ed., p. 131).

26. *Reshit Bikkurim* II, 2.

27. *She'eilat David, Kuntress Derishat Zion vi-Yerushalayim, ma'amar gimmel*.

28. *Beit Yitzchak, Yoreh De'ah*, II, 83.

29. Responsum published from manuscript by R. Menahem Burstin, *Ha-Techelet*, p. 378, 380; and *Ir ha-Kodesh ve-ha-Mikdash* V, 56-57.

30. *Ma'amar Petil Techelet, Kuntress Sha'ar ha-Teshuvah*, 5; *Ma'amar Eyn ha-Techelet* chapt. 46.

31. *Kilayim* 9:1: "*Techelet, argaman and tola'at shani* (Exodus 25) - Just as *sheni tola'at* is a thing which has in it the spirit of life, so the other thing must have in it the spirit of life." Rabbi Leiner interpreted

would not satisfy this condition.

Given the above, it would certainly be a difficult task for any *posek* today to allow synthetic *techelet* in *tzitzit*. The *techelet* for *bigdey kehunah*, the priestly vestments, is quite another matter. There, one has the express permission of Maimonides to use any substance which will provide a skyblue color.

Since as far as *tzitzit* is concerned, there appears no halachic alternative to *dam hilazon*, the snail secretion, researchers in the field who are attempting to cultivate the snails en masse with the express purpose of dyeing *techelet* – *le-shem mitzvat tzitzit*, should be encouraged to continue their efforts in just that direction.

And those that bring many to righteousness shall be like the stars, for ever and ever (Daniel 12:3).

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the *Yerushalmi* to mean that just as the dye *tola'at shani* is from a living thing (i.e. an insect), so the dyes of *argaman* and *techelet* must also be obtained from living creatures. (So, too, R. Elijah of Fulda in his commentary to *Yerushalmi*.) R. Moshe Margalit in his commentaries *P'nei Moshe* and *Mareh ha-Panim*, interpreted the passage as license to dye *tola'at shani* from living creatures other than the kermes insect, exegesis which, by his own admission, pits the *Yerushalmi* against the *Sifra, Metzora'* and the *Sifre Chukkat*. The recently published manuscript of Rabbenu Hillel's commentary to *Sifre Chukkat* to *Sifre'* places in our possession an early authority's perception of the *Yerushalmi*. Commenting on the *Sifre', Chukkat, 82b*, s.v. *ve-lo she-shinato davar aher*, Rabbenu Hillel writes; "We read in the *Yerushalmi*... *Techelet argaman* and *tola'at shani* are of wool. Just as *shani tola'at* is a thing which has in it the spirit of life, namely the worm, so *techelet* and *argaman* are from a thing which has in it the spirit of life, namely lambs' wool which has in it the spirit of life..". Thus the point of the *Yerushalmi* is, that just as *tola'at shani* employs woolen fabric, so too *techelet* and *argaman* definitionally are dyed wool and not a vegetable fabric.