

Philological Insights on Tekheleth

By: EPHRAIM S. AYIL

One would certainly expect the revival of a Biblical commandment in our days to garner enthusiasm,¹ and the resurgence of interest in *tekheleth* has not disappointed. Over the past few decades, *tekheleth* has become widely available through the *Ptil Techelet* organization and their subsidiaries (*techeiles chabura*, Thermochromic). In turn, a blue dye produced from the murex seasnail *Hexaplex trunculus* (“murex”) has reached widespread adoption in Jewish communities around the world, moving from a fringe practice to one well within the mainstream.

Starting in the late-19th century with Rabbi Gershon Henoch Leiner’s doomed identification of the חֲלִזִּין with the common cuttlefish *Sepia officinalis* (“sepia”), interest in this *mitzva* has resurged. That interest has translated into countless articles and books on the subject. Nonetheless, the subject remains rich for further investigation. The Talmud and other early rabbinic texts are still saturated with yet-unexplained problems requiring satisfactory resolution. Towards this end, I have collected several insights about *tekheleth* which developed out of my philological studies.

1. The Etymology and Color of תְּכֵלֶת

For decades, Hebrew תְּכֵלֶת has been recognized as a loan from Akkadian SIG2*takiltum* “blue-purple.”² *Takiltum* is an innovation in Akkadian, formed

¹ This paper is dedicated to my friend Mottie Cohen, with whom I frequently debated this topic, and to my teacher Rabbi Michael Shelomo Bar-Ron, with whom I also sparred. Who knew snails could be so contentious?

² Manfred Dietrich, “Trumpet Snails and Purple Snails as an Indication of the Transfer of Religion and Technology in the Eastern-Mediterranean Region,” *Homeland and Exile*, Brill, 2010, 35–57.

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as a nominal derivative of the D-stem (equivalent to the Hebrew פָּעַל)³ according to the *taqiltum*⁴ pattern. The root of *takiltum* is the Akkadian verb *ekēlu* ‘to be dark,’ cognate with the Hebrew words חֲכָלִי and חֲכָלִיּוֹת ‘dark eyes.’ The root ח-כ-ל ‘to be dark’ is also found metastasized in the root ל-ח-כ of the word כָּחַל ‘dark,’ attested in Biblical-era inscriptions,⁵ but absent from מקרא itself. The Hebrew word כָּחַל ‘dark’ shifted in meaning to ‘blue’ no earlier than medieval times,⁶ resulting in a close semantic connection between the cognates כָּחַל ‘blue’ and תְּכֵלֶת.

The exact etymology may be a mind-numbing technicality, but that *takiltum* derives from Akkadian *ekēlu* ‘to be dark’ is of great significance as far as the color of תְּכֵלֶת is concerned. The color of *takiltum*-dyed wool must have been characteristically dark to the degree that it be worthy of naming after the concept ‘dark.’ This would not be plausible if *takiltum* was turquoise or day-sky blue.

A serendipitous quirk of cuneiform writing is that the system provides multiple correct ways to write a word. The more intuitive way to write *takiltum* is simply to sound out the word using cuneiform characters. For *takiltum*, that might look something like *ta-ki-il-tù*. However, there is another way: because Akkadian cuneiform is inherited from Sumerian cuneiform, a scribe can write an Akkadian word using Sumerian elements that equate to the concept expressed by the Akkadian word. In this way, *takiltum* is sometimes written ^{SIG}ZA.GÌN 𒊕 𒌆 𒌆.⁷ The first element, the determinative ^{SIG} 𒊕 simply means ‘wool.’ The second element, ZA.GÌN 𒌆 𒌆, is quite significant because it is the Sumerian word for ‘lapis lazuli.’ The common convention in Mesopotamia is to name dyes for the gemstone they most closely resembled.⁸

How it is known that ZA.GÌN 𒌆 𒌆 meant ‘lapis lazuli’ in Sumerian is even more remarkable. This deep-blue gemstone, lapis lazuli, was a prestigious gemstone in Mesopotamia and Ancient Egypt. Scholars have dis-

³ Id.

⁴ Joshua Fox, *Semitic noun patterns*, Vol. 52. Brill, 2018. Chapter 31.

⁵ Aaron Demsky (1972) “‘Dark Wine’ from Judah,” *Israel Exploration Journal*, 22(4), 233–234.

⁶ David Curwin, “Kachol,” *Balashon.com*, 12 May 2025, <<https://www.balashon.com/2006/08/kachol.html>> Accessed 12 May 2025.

⁷ Robert T. Biggs (2006) *Chicago Assyrian Dictionary*, Volume 18, T. Entry: *takiltu*.

⁸ See: S. Thavapalan (2019) *The Meaning of Color in Ancient Mesopotamia* (Vol. 104), (Brill).

covered and described in the literature numerous objects carved from lapis lazuli inscribed with inscriptions that describe the object they are inscribed on as composed of ZA.GÌN 𒄩𒄪.⁹ Fortunately for us, the color variation within lapis lazuli is quite limited. Gem-quality lapis lazuli is a deep-blue color with the slightest purple hue, marred only by intrusions of white calcite and golden flakes of pyrite. This striking appearance motivated people to connect lapis lazuli to the night sky. The connection *takiltum* = ^{si}GZA.GÌN = *lapis lazuli(-colored) wool* formally equates the color of *takiltum* with the deep-blue color of lapis lazuli.

To summarize, the etymology of *takiltum* is quite indicative of the color of the dye it represented. Akkadian *takiltum* is derived from the verb *ekēlu* 'to be dark,' which indicates that it must have been dark enough for a derivation from a word for 'dark' to be sensible. Which color that would be is specified by the Sumerogramic writing of *takiltum* as ^{si}GZA.GÌN '[lapis lazuli(-colored) wool]'. A lapis lazuli-colored dye would be particularly appropriate for both the etymology and Sumerogramic writing of *takiltum*. By implication, the daylight-sky blue color that some associate with תְּכֵלֶת is untenable, as there is no way to connect *takiltum* to the notion of light blue. While the meaning of *takiltum* theoretically could have shifted when loaned into Hebrew as תְּכֵלֶת, there is nothing linguistically that motivates such a hypothetical semantic change.

The evidence points in the other direction: a *baraytha* preserved in *Menahot* questions the significance of תְּכֵלֶת of all other dyes, answering that תְּכֵלֶת is "is similar (in color) to the sea, the sea to the firmament, and the firmament to the throne of glory."¹⁰ The *baraytha* then proceeds to quote two verses describing the throne of glory, metaphorically composed of סָפִיר 'lapis lazuli' (not sapphire¹¹). It would be a remarkably strange coincidence if Sumero-Akkadian and early rabbinic cultures both compared *takiltum*/תְּכֵלֶת to lapis lazuli if the dye were not the deep blue iconic of lapis lazuli.

2. The Vocalization & Etymology of חֲלֹזֶן

The etymology of the Hebrew word חֲלֹזֶן 'sea snail' has remained elusive. The term חֲלֹזֶן does not occur anywhere in מִקְרָא, nor is it found in any

⁹ See: L. Leon (1926) Royal inscriptions and fragments from Nippur and Babylon. Objects 49.

¹⁰ *Menahot* 43b.

¹¹ E. S. Ayil, (2024) *Identifying the Stones of Classical Hebrew: A Modern Philological Approach*, Brill, Chapter 7.

inscription from the Biblical period.¹² חלזון first appears in *Tosefta Menahot* 9:6, from a time when Greek borrowings had infiltrated colloquial Hebrew. As a natural conclusion, חלזון has sometimes been etymologized to be a borrowing from Koine Greek ἑλιξ (*helix*),¹³ whence Latin *belix* and English *belix*. This etymology is problematic from a phonetic perspective: the Greek rough breathing accent /h/ corresponds with Hebrew ה (not ח), while Greek ξ represents /ks/ in contrast to Hebrew ז representing /z/.¹⁴ This etymology is not viable.

Before arriving at its true etymology, it is first necessary to establish the proper vocalization of חלזון. Unlike with Biblical words, whose proper pronunciation was canonized by the בעלי המסורת over a millennium ago, the correct vocalization of Hebrew words absent from מקרא is sometimes uncertain. Professor Zvi Koren noted a problem with the familiar vocalization חלזון: The manuscripts always spell the word חלזון. If it was to be vocalized as חלזון, it would be spelled *חילזון¹⁵ (compare זכרון, which is spelled זיכרון in Mishnaic Hebrew). חלזון finds cognates in Syriac *ḥalāẓūnā*, Arabic *ḥalāẓūn*, and previously unrecognized Akkadian *ḫaḥal(l)ūnu*.¹⁶ The regular sound laws of Hebrew motivate a Hebrew vocalization חלזון.¹⁷ This form is similar to the Yemenite tradition, which vocalizes חלזון as חלזון,¹⁸ close—but not identical—to the predicted Hebrew reflex.

Given this cluster of cognates with perfect phonetic correspondence, חלזון must be part of a larger Semitic inheritance,¹⁹ not borrowed from a

¹² It is absent from David J. A. Clines' authoritative *The Dictionary of Classical Hebrew*.

¹³ See, for example, the etymology in the first and second editions of Baruch Stermann's *The Rarest Blue*. Baruch Stermann, *Rarest Blue: The Remarkable Story of an Ancient Color Lost to History and Rediscovered*, (Rowman & Littlefield, 2012).

¹⁴ There is also an irreconcilable disparity in the vowels of the Greek and Hebrew forms.

¹⁵ Z. C. Koren (2022) "Tekhelet: Setting the Ancient Record Straight," *Tradition*, 54(1), 46–72. Footnote 34.

¹⁶ Martin Levey, "Dyes and Dyeing in Ancient Mesopotamia," *Journal of Chemical Education* 32.12 (1955), 625.

¹⁷ For a complete description of these regular sound laws, see: B. Suchard, (2019) "The Development of the Biblical Hebrew Vowels: Including a Concise Historical Morphology," in *The Development of the Biblical Hebrew Vowels* (Brill).

¹⁸ Yosef Amar Halevi (1980) *Talmud Bavli Menuqad*, vol. 6. s.v. Megillah 6a, *et al.*

¹⁹ On the basis of Semitic cognates, Proto-Semitic **ḥalāẓūn* / *ḥaḥalūn* 'sea snail' may be reconstructed. I have not found this reconstruction elsewhere in the academic literature.

foreign source like Greek. It can be reasonably concluded that תלזון is a native word for a native concept: sea snails.

3. 'Trapping' or 'Fishing' תלזון on *Shabbat*?

The *Tosefta*, quoted in *Shabbat* 75a, reads:

הצד חלזון והפוצעו—אינו חייב אלא אחת. רבי יהודה אומר חייב שתים. שהיה רבי יהודה אומר: פציעה בכלל דישה. אמרו לו: אין פציעה בכלל דישה.

One who traps a *halazun* and breaks it is not liable except for one (sin-offering). Rabbi Yehudah says: He is liable twice as Rabbi Yehudah would say: the breaking (of a shell) is in the primary category of threshing. They said to him: Breaking is not included in the primary category of threshing.

Without relitigating the halakhic issues involved, I would like to make an observation as to why the *Tosefta* might have used the word צד 'trap' to describe the act of fishing for sea snails. While this may simply refer to the baited baskets fishermen drop to the seafloor to collect snails, should this explanation not satisfy the reader, the geographical context of murex-fishing offers another possibility.

The Talmud establishes the geographic range of תלזון trappers as spanning the Ladders of Tyre (at the Israel-Lebanon border on the Mediterranean shore) to Haifa.²⁰ As this area was historically Canaanite/Phoenician, perhaps the use of the root צ"ד in צד and צידִי תלזון follows the Phoenician meaning of the root צ"ד, 'to fish,'²² not 'to hunt, trap' as does the root in Classical Hebrew.²³ If so, the use of צ"ד with the meaning 'to fish' may be another instance of dialect-mixture from Phoenician (the dialect of Hebrew spoken by the Canaanites/Phoenicians) in the language of *Ḥaz"l*.

²⁰ TB *Shabbath* 26a.

²¹ The root manifests grammatically as צ"ד in Hebrew, but should be צ"ד etymologically. Weak roots have a tendency to alter the weak consonant in ways which are hard to account for.

²² R. C. Steiner (2007), "On the Monophthongization of *ay to ī in Phoenician and Northern Hebrew and the Preservation of Archaic/Dialectal Forms in the Masoretic Vocalization," *Orientalia*, 76(1), 73–83.

²³ David J.A. Clines (2011), *The Dictionary of Classical Hebrew*, Volume VII Sade—Resh, Entry: צ"ד. 92–3.

4. The Medicinal Use of Snail Shells

Talmud Bavli (*Avodah Zarah* 28b) mentions תְּלָזוֹן as a treatment for hemorrhoids. This section in the Vilna printing reads as follows:

וְאִי לֹא לִיִּיתִי תֵּלֶת טֶרְפָּא קֵרָא דְּמִיִּבְשִׁי בְּטוּלָא וְלִיקְלִי וְלִיבְדֵּר עִלּוּיָהּ וְאִי לֹא לִיִּיתִי
מִשְׁקָדִי חֲלָזוֹן

And if not, bring three gourd leaves that were dried in the shade and he should burn them, and then he should spread the ashes upon the irritated area. And if this is not possible, he should bring from almonds(?) of *halazuns*.

Proponents of the sepia hypothesis have read the ink-sacs of cuttlefish into the “almonds of *halazuns*”. After all, there are sepia-derived homeopathic treatments marketed and sold for the treatment of hemorrhoids. But homeopathic marketing does not constitute any sort of evidence, as homeopathy is not a traditional medicine. Homeopathy is a historically recent (1796) medical conception based on the theory that the more a substance has been diluted in water, the more powerful the resulting potion. While traditional medicines were used by pre-modern societies to varying degrees of success, homeopathy is nothing but a contemporary scam, not based on medical research nor inherited practices, but on the ability of malicious practitioners to sell desperate patients overpriced water.

To the extent that I have been able to determine its source, the homeopathic use of cuttlefish ink for the treatment of hemorrhoids originates from the identification of the תְּלָזוֹן with sepia and the corrupt “almond” reading of the Talmud. The homeopathic ‘doctors’ who use sepia to treat hemorrhoids are basing themselves on those who assume sepia is the תְּלָזוֹן. Those who state that sepia is the תְּלָזוֹן because it is used today to treat hemorrhoids are engaging in an amusing case of circular reasoning. It gets even better. As a consequence of the rather foolish controversy as to the identity of the תְּלָזוֹן, both murex and sepia derivatives are currently marketed in homeopathic medicine to treat hemorrhoids!

Regardless, the Vilna text for this passage is erroneous. The more reliable Paris 1337 and Munich 95 manuscripts provide a different reading for the first word, and a longer prescription for the medical treatment.²⁴

²⁴ The text of a number of early Talmud manuscripts and printings including Paris 1337 and Munich 95, are available on the *Friedberg Project for Talmud Bavli Variants*, *Avodah Zarah* 28b, paragraph 2.

Munich 95	Paris 1337	Vilna
משקרי חלזני וליקלי ונידביק עלי'	משקרי חלזוני וניקלי ונידבק	משקדי חלזוני
...shells of <i>halazuns</i> , and burn them, and spread on...	...shells of <i>halazuns</i> , and [b]urn them, and spread...	...from almonds [of] <i>halazuns</i> ...

משקדי חלזוני is a textual corruption of משקרי חלזוני *halazun shells*, as explained in a now lost entry in the *Arukh* and Rashi (לימ"ץ בלע"ז מין) (*limnice* in Old French, a type of snail).²⁵ The *amoraim* in this passage are transmitting a medical tradition to use *crushed mollusc shells* to treat hemorrhoids. This medical discovery is first recorded among the Ancient Greeks and later recorded by the Arab physicians in the medieval period:

Ibn al-Baytar mentions a *sadaf al-bawāsīr* which, according to its name, was appropriate for the treatment of hemorrhoids; it was indigenous to the Red Sea coast. Ibn Hubal mentions a Babylonian and a Red Sea snail (*sadaf babilī/kulẓūmī*). In pharmaco-zoology, all varieties of mussels and snails are grouped together as *Limnaces*. Since Dioscorides, the burnt shells of various land and sea snails, mussels and oysters have been in use.²⁶

From Dioscorides in the 4th century BCE through the time of the Arab physicians, there was a well-known use of burnt shells as a topical skin treatment for external wounds. A parallel passage to *Avodah Zarah* 28b can be found in *Shabbat* 77b (Vilna):

אמר רב יהודה אמר רב כל מה שברא הקב"ה בעולמו לא ברא דבר אחד לבטלה
ברא שבלול לכתי ברא זבוב לצירעה יתוש לנחש ונחש לחפפית וסממית לעקרב
Said Rav Yehudah, said Rav: "Of all that God created in his world,
nothing was created without a purpose. He created snail for a sore,
fly for a hornet (sting), mosquito for a snake (bite), snake for a boil,
and gecko for a scorpion (sting).

The term which I have here translated 'snail' is שְׂבָלוּל, a difficult word in Psalm 58:9. It is ambiguous whether שְׂבָלוּל should be translated as 'snail' or 'slug,' as both could be accurately described as a creature that "melts away as it moves" (תִּמָּס יִהְיֶה). However, the description of "shabbelul for

²⁵ Rashi to *Avodah Zarah* 28b.

²⁶ D. Waines, Ed., *Food Culture and Health in Pre-Modern Muslim Societies*, Vol. 3 (Brill, 2010).

cut(s)” would seem to be another instance of using shells to treat sores. This passage privileges identifying שָׁבִילִיךְ as a snail too. Of course, there is no reason that Classical Hebrew should only have a single collective term for ‘snail.’ I suggest שָׁבִילִיךְ referred to ‘land snail’ in contrast with תִּלְזוֹן for ‘sea snail.’

I believe I can add one more Classical Hebrew term to our index of snail-words.

Hebrew רָאֲמֹת *rāmōt* is usually considered a valuable coral, but this is implausible. Red coral (*Corallium rubrum*) is a Mediterranean product, which never appeared east of the Isthmus of Suez until the opening of the Suez Canal.²⁷ But the verses in which רָאֲמֹת *rāmōt* is mentioned (Job 28:18, Ezekiel 27:16) suggests a valuable Red Sea tradegood—which does not fit red coral. Gesenius refashioned this identification to instead refer to black coral (*Antipatharia* sp.), but which Harrell *et al.* noted is not known to have been used in the Levant.²⁸ It seems more likely that Coral may be the wrong target altogether. Coral would not have been particularly valuable due to the ease of accessibility of coral in the Red Sea and Mediterranean.²⁹

Hebrew רָאֲמֹת *rāmōt* has frequently been connected with Literary Arabic رَأْمَةٌ *ra'ma(t)*, which *Al-Qāmūs al-Muḥīṭ* (cited by Lane) defines as “The [i.e. bead, or the like, that is worn as an amulet, and] that is [held 30 خَزَرَةً to be] a cause of love, or affection.”³¹ It would be quite helpful to know what Arabic *ra'ma(t)* is for discerning the identity of רָאֲמֹת, but nothing is known beyond its vague categorization as a type of bead or talisman. (I suspect the variety of *aqiq* known as *aqiq ra'ma* mentioned by Amar³² to be a secondary derivation from the term *ra'ma(t)*, as *aqiq* varieties are adjectivalized from other nouns.) Arabic *ra'mat* would appear on its face to derive from the Arabic root *r-'m* ‘to love’ with the feminine suffix *-at*

²⁷ S. T. Byington (1945) Hebrew Marginalia III, *Journal of Biblical Literature*, 339–355.

²⁸ J. E. Harrell, J. K. Hoffmeier, and K. F. Williams (2017) “Hebrew Gemstones in the Old Testament: A Lexical, Geological, and Archaeological Analysis,” *Bulletin for Biblical Research*, 27(1), 1–52.

²⁹ Eric Burrows (1941) “Notes on the Pearl in Biblical Literature,” *The Journal of Theological Studies*, 42(165/166), 53–64.

³⁰ Kharaza.

³¹ Edward W. Lane (2017) *An Arabic-English Lexicon*. Vol 3. 998. Entry: Here too الرأمة.

https://lexicon.quranic-research.net/data/10_r/009_rOm.html#raOomN

³² Zohar Amar, *The Beauty of Gemstone* (Machon Har Brachab, 2017) [Hebrew], 164.

(possibly to form a *nomen unitatis*, contrast Hebrew רַמֹּת *rāmōt*—a *plurale tantum*).³³

An etymological derivation from *r'-m* 'to love' is suggestive of an identification with one object in particular: the seashell cowrie (*Cypraea* sp.). Cowries—their natural shape suggestive of a certain female feature—were associated with fertility in Ancient Egypt. On Egyptian female figurines, cowries appear strung on girdles around the hips.³⁴ The semiological relationship between cowries and fertility is easily broadened to the concept of 'love.' Arabic *ra'ma(t)* is not a living word, and any such association between cowries and fertility/love is long gone from that culture. However, Hebrew would have borrowed Arabic *ra'ma(t)* a millennium and a half before the Islamic conquest, more than sufficient time for such an Arabic word to have been displaced. Hebrew רַמֹּת *rāmōt* must thus be borrowed, directly or indirectly, from Arabic *ra'ma(t)*.

Cowrie shells were indeed popular in the jewelry of Ancient Israel.³⁵ "Cowrie shells are very common in the Iron Age. In the Iron Age II levels at Kadesh Barnea, cowrie shells comprised one third (128) of all the shells recovered during excavation."³⁶ While the Israelites evidently valued cowries as a fashion accessory, adopted through a common Levantine fashion, there is no evidence whatsoever that the Israelites held a symbolic association between cowries and fertility.³⁷ Perhaps it goes without saying, but cowries are a family of sea snails.

Rashi has also applied two other Biblical terms to mean 'snail.' Rashi glosses חֲמַט in Leviticus 11:30 as 'snail,' but this word properly refers to a particular type of lizard, most likely a chameleon.³⁸ Similarly, he uses תּוֹלַעַת to refer to the body of the תּוֹלָדוֹן, but תּוֹלַעַת referred specifically to the crimson scale insect (a special development from תּוֹלַעַה).

³³ The root *r'-m* 'to love' is restricted to Arabic; my friend Dr. Benjamin D. Suchard suggested to me that Akkadian *rāmu* 'to love' derives from PS **rhm* 'to be compassionate.' The Arabic root must therefore be borrowed from Akkadian.

³⁴ A. Golani (2014), "Cowrie Shells and Their Imitations as Ornamental Amulets in Egypt and the Near East," *Polish Archaeology in the Mediterranean*, 2(XXIII), 71–83.

³⁵ A. Golani (2013), *Jewelry from the Iron Age II Levant* (Vol. 34), *Academic Press/Vandenboeck & Ruprecht*, 40.

https://www.zora.uzh.ch/id/eprint/136771/1/Golani_2013_Jewelry_from_the_Iron_Age_II_Levant.pdf

³⁶ *Id.*, 177.

³⁷ Despite the claim frequently appearing in the academic literature, there is no evidence for the use of cowries as money in the Levant 3,000 years ago.

³⁸ Zohar Amar (2016) *Shmona Sbratzim*, Mekhon Moshe: Kiryat-Ono. [Hebrew]. 13, 66.

The Talmudic reference to use of burnt snail shells (משקרי חלזוני) as a topical skin treatment indirectly confirms that חלזון referred to the snail. We have also been able to suggest three words which fulfilled the semantic category of ‘snail’ in the Biblical period: חלזון ‘sea snail,’ שבלול ‘land snail,’ and ראמת ‘cowrie shell(s).’

5. The Location of Luz

Bavli in *Sotah* 46b quotes Judges 1:26, then citing a *baraytha* which states that in *Luz*, *tekeheleth* is dyed:

”וַיֵּלֶךְ הָאִישׁ אֶרֶץ הַחִתִּים וַיְבֹנֶה עִיר וַיִּקְרָא שְׁמָהּ לֹזוּ הוּא שְׁמָהּ עַד הַיּוֹם הַזֶּה,” תנא: היא לוז שצובעין בה תכלת...
 ...

“The man went to the land of the Hittites, and he built a city. He called its name *Luz* — that is its name to this day.” It is taught in a *baraytha*: It is Luz wherein they dye *tekeheleth*.

The identity of the city of Luz has been a matter of uncertainty among scholars. In my opinion, this location is straightforward to identify when the text is read properly. Judges 1:22–26 describes how a family from the original city named Luz (the prior name of Beth-El) went to the “land of the Hittites,” where they founded a new city called Luz. As the *baraytha* in *Sotah* quotes Judges 1:26, the city in which *tekeheleth* was dyed is not Beth El but the New Luz in “the land of the Hittites.” The equation between *Luz* and *tekeheleth* production is better known from a citation to this *baraytha* in *Sanhedrin*. The reference in *Sanhedrin* 12a has been amended by some modern scholars to Lod (Lydda) following the Florence 9-8 manuscript, but this emendation is erroneous as demonstrated by the parallel source in *Sotah*. The Biblical reference which opens the *baraytha* in *Sotah* is unambiguously to *Luz*, not *Lod*. More problematic is where exactly the newer city of Luz should be located. Professor William F. Albright suggested that this was the city of Lawazantiya,³⁹ located north of the Amanus range. But based on how the name of Lawazantiya is rendered in other Semitic languages (all preserving the element, *-antiya*), this is unlikely.

Dr. Bryant G. Wood offered an ingenious observation of the Hebrew phraseology for the Hittites/Hethites in the Biblical text.⁴⁰ Noting the unusual distribution of חתי versus חתים, he suggests the terms may not be

³⁹ Menahem G. Glenn, “The Word לוז in Genesis 28.19 in the LXX and in Midrash,” *The Jewish Quarterly Review* 59.1 (1968), 73–75.
<https://www.jstor.org/stable/pdf/1453765.pdf>

⁴⁰ B. G. Wood (2011), “Hittites and Hethites: A Proposed Solution to an Etymological Conundrum,” *Journal of the Evangelical Theological Society*, 54(2), 239.

identical at all. He proposes that the term **חִתִּי** (plural: **בְּנֵי־חֵת**) exclusively applied to the descendants of **חֵת**, who resided in Canaan from pre-Abrahamic times. On the other hand, **חִתִּים** applied exclusively to the Indo-European people who resided in Anatolia and northern Syria. I would define the **בְּנֵי־חֵת** slightly differently, seeing the **בְּנֵי־חֵת** as Semites with Hittite “citizenship,”⁴¹ and therefore including the Iron Age Neo-Hittite states (slightly modifying Wood’s hypothesis.) Because the **אֶרֶץ הַחִתִּים** “land of the Hittites” of Judges 1:26 must refer to Anatolia,⁴² an Anatolian location for Luz should be sought.⁴³

Based on this insight, I suggest a new identification, a perfect phonetic match for Luz. The Iron Age Anatolian kingdom of Lydia overlapped somewhat with historical Hittite territory. Notably, Lydia (Greek: Λυδία) would have been pronounced as **Lūd* in Lydian. Because of the merger between PS **ḏ* and **d̥* in Biblical Hebrew, the reflex לֹד would be the expected reflex of **Lūd̥* or **Lūd*. If this connection is correct, the Lydian kingdom would have originally emerged from a city called Lydia.

Linguists of Ancient Anatolia derive the name of Lydia from the Bronze Age toponym Luwia through a quirky Lydian sound change.⁴⁴

⁴¹ Perhaps by giving Hittite “citizenship” (or whatever the ancient conception) to local Semites, the Hittite Empire was able to exert influence over Canaan.

⁴² This interpretation creates a slight problem in Joshua 1:4, which defines the borders of *Eretz Yisra’el* as **מִהַר־חֲבָרָה וְעַד־הַנָּהָר הַגָּדוֹל נְהַר־פָּרָת כָּל־אֶרֶץ הַחִתִּים** “Your territory shall extend from the Wilderness and the Lebanon to the Great River, the River Euphrates [on the east]—the whole land of the Hittites—and up to the Mediterranean Sea on the west.” The territory of the Hittite Empire, and Lydia in particular, must have been outside *Eretz Yisra’el*. Lydia is the country where the city of סָרְדִּס ‘Sardis’ mentioned in Ovadiah 1:20 belonged. In Sardis, the “exile of Jerusalem” resided, therefore, it must be outside *Eretz Yisra’el*. A careful reading of Joshua 1:4 will find that it describes borders, not inclusionary territory. Therefore, “the whole land of the Hittites” must be a description of the northern border with an implied “[until].” The Greek translator of the “Septuagint” to Joshua, dealing with the same problem, omits the line **כָּל־אֶרֶץ הַחִתִּים** altogether.

⁴³ That the Hittite Empire collapsed prior to the period of the Judges is irrelevant; Judges 1:26 speak of the “land of the Hittites” which would exist in historical memory long after the empire and its people disappeared.

⁴⁴ Alwin Kloekhorst, “Luwians, Lydians, Etruscans, and Troy: the linguistic landscape of northwestern Anatolia in the pre-classical period [2022]” in *The political geography of western Anatolia in the Late Bronze Age*. Proceedings of the EAA Conference, Bern, 7 September 2019 (edd. I. Hajnal, E. Zangger, J. Kelder), Budapest: Archaeolingua, 201-227.
Robert S.P. Beekes (2003): “Luwians and Lydians,” *Kadmos* 42: 47–49.

Mitigating against that etymology is a chronological issue: Luz of Judges is placed centuries before Lydia would have evolved via sound-change. In addition, the Lydian language is not a descendant of Luwian, but an independent subbranch of Anatolian.⁴⁵ The connection between Luwian and Lydia may be less secure than it initially seems.

This Anatolian locale is also particularly remarkable because the word *אֶרְמָן*, referring to a different color of murex-derived dye, is a direct borrowing⁴⁶ from Hittite *arkaman-* ‘tribute (plural) → purple-dyed cloth,’ a language from that region. Hittite *arkaman-* with a single *-m-* is the predecessor of Hittite *arkamman-*. Lack of gemination in Semitic *-m-* indicates that this word was loaned into Northwest Semitic—at the latest—during the Middle Hittite⁴⁷ period (circa 1450–1380).⁴⁸ Anatolian loanwords are rare in Classical Hebrew, the most authoritative study of such borrowings counts only six from Hittite and Luwian combined.⁴⁹ Given the general rarity of Anatolian borrowings in Hebrew, that a Hebrew word for murex-dyed cloth can be traced to Anatolia is supportive of the link between Anatolia and murex dyeing. As would be expected if this hypothesis were true, Greco-Roman sources confirm that Lydia was a major producer of *purpura*-dyed fabrics.⁵⁰

A few preliminary conclusions can be stated. According to the *baraytha*, *tekheleth* was commonly dyed in Luz during the Roman period. Luz can be positively identified as Lydia, then part of the Roman province of *Asia*. This fully comports with what external sources state about the dyeing-industry in Lydia at the time, especially of *purpura*-dyed fabrics.

6. How תַּכְלֵת Was Lost, Or More Importantly, How It Wasn’t

Over the past half-decade, I devoted an unhealthy amount of time pondering why Midrash Tanḥuma describes *tekheleth* as תַּכְלֵת ‘obscured.’⁵¹ The

⁴⁵ I. Yakubovich, *Sociolinguistics of the Luvian Language* (Leiden: Brill, 2010), p. 6.

⁴⁶ B. J. Noonan, *Non-Semitic Loanwords in the Hebrew Bible: A Lexicon of Language Contact* (Penn State Press, 2019) pp. 64–65.

⁴⁷ Federico Giusfredi and Valerio Pisaniello, “Three Cuneiform Notes,” *Bibliotheca Orientalis* 76.1–2 (2019), 25–35.

⁴⁸ Alwin Kloekhorst, *Etymological Dictionary of the Hittite Inherited Lexicon* (Brill, 2007), p. 4.

⁴⁹ B. J. Noonan, *Non-Semitic Loanwords*, p. 281.

⁵⁰ D. E. Graves (2017), “What is the Madder with Lydia’s Purple? A Reexamination of the Purpurarii in Thyatira and Philippi,” *Near East Archaeological Society Bulletin*, 62, 3–28.

⁵¹ *Midrash Tanḥuma, Bemidbar, Parashat Shelah* 15 (excerpt).
https://www.sefaria.org/Midrash_Tanchuma%2C_Sh'lach.15?lang=he

dating of Midrash Tanḥuma is controversial, in part a consequence of the multiple recensions which exist in manuscript. The most common estimation, which I am sympathetic to, places the redaction of this text in the Savoraic (early Ge'onic) period. The full quote:

וְעַכְשָׁיו אֵין לָנוּ אֵלָּא לָבָן, שֶׁהִתְבַּלְתָּ נִגְנוֹ, מִצְוָה בְּלָבָן.

And now we do not have (any strings) except for white (strings), that the *tekheleth* (string) has been *obscured*, (the) commandment is in (the) white (strings).

‘Obscured’ (נִגְנוֹ) is an odd choice of words if the Midrash merely intended to describe *tekheleth* as ‘lost’ (נִאֲבָד) or ‘forgotten’ (נִשְׁכַּח). This is the first reference to *tekheleth* being unavailable, and my hunch is that the unusual language is tied to its historical context. Mystical reinterpretations only obscured the social-historical reality at which the Midrash is hinting.

Dyeing technology improved over time. During the Roman period, the first reference is found to plant-based methods to create deep blue cloth which did not necessitate the labor-intensive use of murex snails. While these ‘fakes’ were viewed as inferior knock-offs (that necessitated legal prohibition), plant-based blues would be fully standard by the High Middle Ages. Roman dyeing capabilities are indicated in the surviving recipes from the period, including the Stockholm papyrus and Leyden papyrus X.

The Talmud mentions woad and other ingredients used to fake *tekheleth*,⁵² but the colorfastness of this plant-based dye appears to have been initially poor. Radbaz speculates that improved colorfastness of woad (אֶסְטִיט) made *tekheleth* obsolete for the production of deep blue dye for secular purposes.⁵³ Perhaps selective breeding of woad improved its colorfastness, though extraction technique, dyeing processes, and mordants are usually given the attribution. Causation aside, this technological shift created a vulnerability in *tekheleth* production. For secular purposes, murex dyes remained in use only for colors unattainable by cheaper methods, while Jews maintained—for religious purposes—the recipe for producing *tekheleth*-shades (deep blue).

The loss of *tekheleth* is often attributed to Roman-Byzantine edicts against wearing murex purples (see Elliott⁵⁴ for a list and discussion).

⁵² TB *Menahot* 42b–43a.

⁵³ *Teshuvot HaRadbaz*, Volume 2, *teshuvah* 685.
https://www.sefaria.org/Teshuvot_HaRadbaz_Volume_2.685.2

⁵⁴ Charlene Elliott (2008), “Purple pasts: Color codification in the ancient world,” *Law & Social Inquiry*, 33(1), 173–194.

What proponents of this hypothesis miss is that these edicts were largely ignored, requiring frequent revision and intensification. At no point were Roman-Byzantine decrees against *purpura*-wearing fully effective, as Elliott⁵⁵ points out, “decrees by Nero and Diocletian, and particularly by Theodosius and Valentinian, all point to the existence of a widespread illegitimate traffic in purple, a traffic that occurred despite all the prohibitions.”

Attributing the loss of *tekeleth* to Roman-Byzantine edicts against wearing murex purples grew out of a difficult comment by Ramban regarding *tekeleth*:

והתכלת גם היום לא ירים איש את ידו ללבוש חוץ ממלך גוים.
And the *tekeleth*—even today no man would raise his hand to wear
it except the *King of Nations* (מלך גוים).⁵⁶

It is quite a stretch to assume that Ramban is referring back to the historical decrees of Roman/Byzantine emperors when he uses the phrase מלך גוים ‘King of Nations.’ In another context, Ramban uses the term מלך גוים ‘King of Nations’ to refer to צור, the priest-king of Midian.⁵⁷ The basis for interpreting the phrase מלך גוים ‘King of Nations’ to be the Roman/Byzantine emperor is Ramban’s comment that תדעל מלך גוים זו מלכות אדום שהיא מכתבת טירוניה מכל אומות העולם “*Tid’al king of Goyim*—this is the kingdom of Edom (Rome) which writes out a levy [and collects assessment] from all nations of the world.”⁵⁸

Ramban, writing in 13th century Catalonia, is not describing the historical Roman emperor, but the contemporary head of the Papal States, the pope! Spanish Jewry used the title מלך גוים ‘King of Nations’ for the pope in the *Agreements of Barcelona* a century later.⁵⁹ Catholic doctrine of the 13th century, which culminated in the *Unam sanctam* (1302), viewed the pope as having a super-monarchical role.⁶⁰ Therefore, use of the title מלך גוים for the pope was in line with the Christian political thought of Ramban’s environs. While a direct link between the pope and the color

⁵⁵ Ibid., 186.

⁵⁶ Nachmanides’ *Commentary to Exodus* 28:2.

⁵⁷ Nachmanides’ *Commentary to Numbers* 25:11.

⁵⁸ Nachmanides’ *Commentary to Genesis* 14:1.

⁵⁹ Macías, M. (2022), *The Haskamot of Barcelona of 1354: A Historical, Legal, and Political Approach*, 33.

⁶⁰ My appreciation to Dr. Matthew Mehan for his assistance in helping me understand the changing conception of the pope as king over time.

blue is difficult to find, a connection between the color blue and the Virgin Mary emerged at the same time.⁶¹

Regardless of what Ramban intended in his comment, there is no reason to resort to an exceptional historical scenario (such as the Roman prohibition on *purpura*) to account for the loss of *tekheleth*. Rather, the loss of *tekheleth* was part of a general pattern of cultural genocide prosecuted against the Jewish people in Byzantine Palestine. The Savora'ic period witnessed centuries of Byzantine persecution against the Jews of the Land of Israel, which resulted in intense cultural decay. Following our failed revolt against the Byzantines during the reign of Emperor Heraclius, the Byzantine persecution reached its apex with a class of antisemitic legislation enforced with brutal effectiveness. As a consequence, the cultural memory of many of the commandments was forgotten by Jews of the Land of Israel. After the persecutory regime was lightened, Jews attempted to reconstruct the practice of the commandments based on Jewish texts and the material culture of their non-Jewish neighbors. This was a perilous endeavor: the Talmud often takes for granted that the reader knows what it is talking about, so terms are discussed without defining them.

This “rupture and reconstruction” of Torah observance in early Muslim-occupied *Eretz Yisra'el* was met with biting criticism from the Babylonian rabbinate. Once reconstructed Jewish practices became communally normative—even customary—the Geonate had to respond to these inadvertent reforms. Pirkoi ben Bavoi, a 9th century Babylonian (grand-) student of Yehudai Ga'on, crusaded against the practices of Palestinian Jewry, arguing that those traditions which developed under persecution were illegitimate, noting that some instances constituted halakhic violations.⁶²

Though the murex dye industry survived Byzantine persecution of the Jewish people, knowledge of how to create deep blues, which was then known only to Jewish dyers, was lost. Babylonian Jews relied on communities around the Mediterranean coast to produce *tekheleth* because *H. trunculus* cannot be found in Babylonia. Once knowledge of how to produce *tekheleth* was lost among Jewry in the Land of Israel, it could not be recovered from the non-Jews.

Neither could it be easily recreated. To achieve purples from *H. trunculus* is easy, but to obtain blues is an arduous task. Ptil Techelet's process discovered in the 1980s requires administration of ultraviolet light to the dye precursor in an anaerobic environment, conditioning which would

⁶¹ M. Pastoreau, *Blue: The History of a Color* (Princeton University Press, 2023).

⁶² Y. Hoffman (2016) “Is Parchment Klaf? The Halakhic Status of Contemporary STaM,” *Hakirah*, 21, 197–205.

have been impossible before the modern invention of inexpensive transparent glass. Over the last few years, my friend Abraham Cohen invested significant time and capital rediscovering a process for creating deep blue colorfast murex dye using substances and processes available to ancient Jews. That it took modern men, with instant access to ancient textual sources from around the globe, leisure time, and excess money for expending on scientific experimentation, until *circa* 2020 to recreate such a process testifies to the difficulty of rediscovering how to create murex blues. No wonder medieval Torah scholars failed to recreate *tekheleth*!

Despite the inability to create blue from *H. trunculus*, memories of *tekheleth*'s source and color lingered on. Whereas surviving medieval Jewish sources are somewhat ambiguous as to the identity of the חֲלָזוֹן הַתְּכֵלֶת (consistently rendering חֲלָזוֹן with colloquial words for 'worm' or 'snail'), early Modern rabbis consistently identify the חֲלָזוֹן הַתְּכֵלֶת with *H. trunculus*. For example, Rabbi Ya'ir Bacharach (17th century), author of the חוֹת יאִיר, wrote that the חֲלָזוֹן was called the *purpura*.⁶³ So confident was he in the equation of the חֲלָזוֹן with the murex that he was willing to reinterpret the color of *tekheleth* as purple! Similarly, Rabbi Eliezer ben Yoel HaLevi of Bonn (12–13th century) glosses the Mishnah's statement בֵּין תְּכֵלֶת לְכֶרֶת as בֵּין פּוֹרְפִירִין וּבֵין פְּרִיסִינָן⁶⁴ an exact translation of the Hebrew text into Greek, providing a remarkable equation of *tekheleth* with *purpura*-dye.⁶⁵

Jews of the Land of Israel remembered that *H. trunculus* was the חֲלָזוֹן הַתְּכֵלֶת mentioned in rabbinic texts, but were unable to recreate the deep blue dye. This hypothesis explains a perplexing statement in Rambam that has been obscured beneath manuscript corruption: "And it [*tekhelet*] is no longer with us today, because we do not know how to dye it, since not every 'blue' (*azraq*) hue⁶⁶ in wool is called *tekhelet*, but it is a certain 'blueness' (*zarka*), which is not possible today."⁶⁷ Unable to recreate a deep blue from murex snails, the remaining memories around *tekheleth* slowly

⁶³ מקור חיים סי' יח ס"ק ב.

⁶⁴ Ra'avyah to JT *Berakhot* 1:2. Credit to Rabbi Yehoshua Yankelewitz for discovering the correct reading of this text from manuscript.

⁶⁵ For a collection of similar sources, see: קונטרס המכתבים <https://www.techeiles.org/wp-content/uploads/2020/12/Kuntres-Michtavim-5780.pdf>

⁶⁶ Here, Koren (footnote 67 below) transliterates *azrak* and *zarka* later, but these must be spelling errors on his part. I have corrected the spelling here.

⁶⁷ Maimonides' *Commentary on the Mishnah to Menahot* 4:1. Version from reliable manuscripts, quoted in: Zvi C. Koren (2022), "Tekhelet: Setting the Ancient Record Straight," *Tradition*, 54(1), 46–72.

entropied into oblivion. The death of the murex dye-industry was perhaps the final nail in the coffin. I have been unable to substantiate the claim that commercial murex dyeing continued until the fall of Constantinople in 1453,⁶⁸ but it is certainly a plausible end date.

Instead of speaking about when *tekbeleth* was lost, we may instead speak of the stages of its loss. Four stages may be discerned in the loss of *tekbeleth*:

1. The obsolescence of murex snails for creating quality deep-blue dyes. [Roman period]
2. The loss of the process for creating deep-blue dyes from *H. trunculus*. [Byzantine period]
3. The end of the murex dye-industry. [15th century or prior]
4. The loss of the identity of the תְּכֵלֶת הַיָּם. [19th century]

Returning to the issue as to the meaning of the word תְּכֵלֶת ‘obscured,’ I contend this word lies halfway between “known” and “forgotten.” Neither the color (blue) nor source (murex) of *tekbeleth* appears to have been forgotten, only the knowledge of how to produce a blue dye from the murex. Evidently, the process for its manufacture was lost. And lost it remained until the legendary revival of *tekbeleth* in the late-20th century, albeit with a manufacturing process that differed from that of ancient times. It is not clear to me whether Jewry will demand a revival of the ancient process for producing deep-blue murex dye for *tekbeleth*. While technically possible, it will require retooling existing manufacturing processes or a capital-intensive investment in a new enterprise.

Conclusion

In the beginning, the only way to produce deep-blue dyes was with murex snails. The first people to write, the Sumerians, called it ^{si}GZA.GÌN. 𒊩𒌆𒀭 because deep-blue wool is indeed the color of lapis lazuli. Forming their own name for this precious color, the Akkadians used 𒊩𒌆𒀭 to spell *takīltu*, a derivative of a root meaning ‘dark’. It was this Akkadian word *takīltu* that was borrowed into the ancestor of Hebrew. Reshaped into the word תְּכֵלֶת, this word was commonly understood at the time of the giving of the Torah to refer to a deep blue murex dye.

Even after plant-based substitutes displaced murex in the general production of deep-blue dyes, our ancestors retained knowledge of how to

⁶⁸ F. Brunello, *The Art of Dyeing in the History of Mankind* (The American Association of Textile Chemists and Colorists, 1973), p. 124, footnote 2.

produce deep-blue dye with murex to fulfill the mitzvah of *tekheleth*. Intense Byzantine persecution following the failed Jewish revolt against Heraclius saw the cultural knowledge of how to perform various mitzvot exterminated. While pockets of Jews survived, the population and educational level that remained was insufficient to retain complex processes. The Babylonian community could not maintain *tekheleth* production because the murex does not occur nearby. Unable to produce a blue dye from the murex, its identification with the תְּלָזוֹן הַתְּכֵלֶת was gradually forgotten and suddenly in doubt: perhaps it was another sea creature after all?

The story of the discovery, loss, and rediscovery of *tekheleth* is a story whose form is not yet fixed, whose characters are still in flux, and whose setting keeps shifting. Yet the more that is uncovered and resolved on the subject, the more confident we are that we have the right source and colored dye. Such confidence is by no means limited to scholarly circles. *Tekheleth* has been mainstreamed in recent years, I anticipate that near day when every man in shul will have his *talet* fringed with that striking deep blue *tekheleth*. 