

Copepods in NYC Water: A Scientific and Halachic Background

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In June 2004, after hearing much discussion and reading about it in the national media, many in the New York City Jewish world began worrying about tiny creatures known as copepods in their drinking water, and turned to their rabbis for guidance. While not rendering an opinion, this article will attempt to provide important background information for tackling this important question of how the presence of copepods in New York City water impacts upon halacha. It will first provide the physical details of the nature of the New York City reservoir and water distribution system as they relate to this query and then highlight some of the important halachic analyses on this issue and how the current *poskim* rule on the matter. As will be explained below, this problem is unique to the New York City water distribution system resulting from unique exemptions from federal filtration requirements.

The technical information in this article is derived from a report commissioned by the Orthodox Union on the question of the copepods in New York City water, compiled by Rabbi Yaakov Dovid Lach. Unless otherwise noted, all facts herein presented are based on Rabbi Lach's report (version 3.5) and the DEP (Department of Environmental Protection) information that he obtained.

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What are copepods?

Copepods are aquatic crustaceans (they have an exoskeleton that covers their bodies). They are the most prevalent organisms found in most water reservoirs in the United States. Copepods are an integral part of the food web and vital in maintaining the health of the water system. They are usually translucent or pale gray, but they can be quite colorful due to ingested plant pigments. They have a distinctive pair of swimming antennae and a single anterior eye.

There are three species of copepods in the New York City reservoir system that appear in tap water: 1. *Diatomocyclops thomasi*, 2. *Mesocyclops edax*, 3. *Skistodiaptomus pygmaeus*.

Background on the New York City water distribution system:

The New York City water delivery system is a dynamic network of engineering ingenuity. The details of the system are rather complex; only an outline relevant to the halachic parameters of the copepods will be discussed. The phenomenon of copepods in tap water is limited to cities such as New York City that are exempt from federal Safe Drinking Water Act's filtration requirements since its water meets certain health quality standards (a rather unique stature).

New York City has three major water systems, each consisting of numerous reservoirs and controlled lakes. The oldest, the Croton system, supplies water exclusively to parts of upper Manhattan and the Bronx and accounts for approximately 10% of the total water distribution. Unlike the other two systems, however, the Croton system's water quality has not been meeting federal standards. Water conditions in Croton occasionally require that the Croton system be taken out of service completely, especially during the summer and fall. The federal government therefore has ordered New York City to

build a filtration plant for its Croton water supply, with the City deciding to build this plant on the Mosholu Golf Course in the Bronx in the very near future.¹ At that point in time, the *poskim* will have to consider how the new filtration system impacts the distribution of copepods for halachic analysis.

The two other water systems are the Catskill and Delaware systems, with the Catskill providing about 40% and the Delaware 50% of the total water distribution. These systems are fed by rivers and creeks that derive their sources from rainwater and melting snow that sink through the ground to form aquifers (underground rivers) that emerge later as natural springs. The Delaware system contains four main reservoirs that drain into the Delaware aqueduct that continues to the Kensico reservoir or the West Branch reservoir of the Croton system. The Catskill system contains two main reservoirs, Schoharie and Ashokan. Legal regulation controls the water travel between these two reservoirs through the Shandaken tunnel by dictating the number of open and closed gates at the intake gate-chamber of Ashokan. From Ashokan, water travels to the Kensico reservoir where it mixes with water from the Delaware system (both systems can bypass Kensico but only in instances of extreme emergency). Hillview reservoir accepts the water flow from Kensico via an aqueduct and acts to equalize the difference between the steady flow in the aqueducts and the varying water usage in the city. From Hillview, water is delivered through the city through two enormous tunnels for distribution. All water leaving Kensico and Hillview reservoirs is chemically treated upon exit with chlorine (among other things) to kill inhabiting zooplankton and meet disinfection requirements

1. See "Why New York City Needs a Filtered Croton Supply," at <http://www.nyc.gov/html/dep/html/press/03-25pr.html>.

Most of the city derives its water from one of these two tunnels. In Staten Island, water collects in one of the world's largest underground water tanks before delivery, while in certain parts of Queens, water delivery is complemented by local natural springs.

Halacha

The issues are presented in a 'pseudo-sequential' order – that is, from the bottom up. The question of the status of the copepods in halacha, their source from the reservoirs and their function in various mixtures (*ta'aruvot*) will be discussed first. The need for filtration depends not only on whether the copepods present a valid halachic problem, but also on their frequency of occurrence and concentration at the faucet. It must be kept in mind that while there are *poskim* who argue that the copepods in fact should be prohibited, this may not have bearing on the need to filter. The criteria of concentration and frequency will be discussed at the end of this section. The Torah (*Vayikra* 11: 9-13) explicitly forbids the consumption of creeping creatures without fins and scales (*sheratzim*), whether they live on land or in the sea. Unlike other prohibitions regarding food items the consumption of a *sheretz* entails the violation of four separate prohibitions, entailing four sets of punishments.² The Gemara in *Bava Metzi'a* 61b even goes so far as to declare that *yeti'at Mitzrayim* would have been worthwhile if its only result was *Bnei Yisrael* receiving the prohibition against forbidden *sheratzim*! It is therefore not taken lightly by the *poskim* and is cause for serious concern.

I. Creature Size in Halachic Criteria:

a. Visibility

2. *Makkot* 16b.

As noted above, the copepods in question range in size from 500 to 1,200 μM . They should not be defined as microscopic, as the average person, when looking closely can see objects larger than 40 μM .³ Actual identification of such small objects, however, requires substantially larger sizes. Their lack of immediate visibility in a glass of water led many people to assume that they are indeed microscopic and therefore not halachically prohibited.⁴ The chlorination process intended to kill the copepods leaves them as dead, translucent creatures that take a bit more time and focus to ascertain and distinguish.⁵ Identifying these creatures as such does indeed take some getting used to; those who have been doing so for longer can usually find them rather quickly. They are simplest to see in a pool of shallow water over a dark background. However, it must be noted that those "experts" trained in identifying these creatures do not have special visual capabilities – they have merely learned how to look at water properly. While almost anybody can be taught to find them in the water, the positive identification of copepods as creatures is far more difficult and most easily undertaken with the aid of a microscope.

b. Visible but not identifiable as a *sheretz*

R. Shmuel Wozner discusses the status of similar creatures

3. At a distance of about a meter, a person can see objects larger than 100 μM , slightly smaller than half the size of a period at the end of a sentence in a newspaper (see www.madsci.org/posts/archives/feb2000/951008843.Gb.r.html).

4. Many *poskim* have already discussed this issue at length – all agreeing that microscopic creatures are not within the realm of halachic prohibitions. See *Binat Adam* (38:8 ff 34), *Aruch HaShulchan* (84:36), *Shu"t Tuv Ta'am va-Da'at* (2:53, 3:1:160), *Iggerot Moshe* (YD 2:146), *Yechaveh Da'at* (6:47) and the sources cited therein.

5. In reality, only a tiny percentage of copepods make the journey from reservoir to faucet while avoiding their demise.

found on citrus fruits (where the creatures are visible but not identifiable as creatures).⁶ He claims that visibility alone does not entail prohibition; the creature must be identifiable as a creature to pose a problem. He argues that in such cases “it is not the person’s vision that brings about the prohibition, but rather the microscope [allowing for the creature identification].”⁷ This also seems to be the initial assumption of R. Shlomo Zalman Auerbach.⁸ R. Hershel Schachter noted that, based on the Chazon Ish’s position regarding the history of halachic development, there is further room to rule leniently.⁹ The Chazon Ish explained the Gemara’s declaration that the “world experienced 2000 years of Torah” to mean that all of halacha was established during that time period and that it can no longer change.¹⁰ R. Schachter argues that the halachic definition of vision was established then as well. Since during that time period these creatures were not identifiable as *sheratzim* (mechanical visual aids had not yet been perfected), our contemporary superior visual ability has no relevance as regards these creatures’ status; thus ingesting them should be permitted.

6. *Shu"t Shevet ha-Levi* 7 (YD 122).

7. It is not perfectly clear that R. Wozner would rule similarly in our case. At the very end of the responsum he explains that even the movement of the creatures in question could not be seen without visual aids. Copepod motion in the reservoirs is easily viewed by the unaided human eye and therefore it is not entirely clear what R. Wozner would rule concerning copepods.

8. Cited in *Shemirat Shabbat ke-Hilchetah* (chapter 3, note 105). A parallel idea is recorded by R. Hershel Shachter in the name of R. Kalman Epstein who cites it from R. Yisrael Gustman *zt"l* who quoted it in the name of R. Chayim Ozer Grodzinsky *zt"l*.

9. R. Schachter penned two separate responses to this issue, the first lenient and the latter strict. The second responsum can be read in translation in *Kashrus Magazine* 25:1 (2004), 199.

10. *Chazon Ish* YD (5:3), EH (27:3).

The Chazon Ish himself, however, rejected such an idea.¹¹ If something is visible and we know that it is a *sheretz*, then it is prohibited whether or not we can visually identify it as such. It is not a person's vision that "causes" the *issur* as R. Wozner claimed, but rather the fact that the object in question is in fact a *sheretz* that brings about the prohibition. R. Yehoshuah Neuwirth relates that upon hearing that the Chazon Ish had been stringent in this matter, R. Auerbach reversed his previous opinion and agreed to the Chazon Ish's position.¹² Furthermore, when news of this story broke in June 2004, R. Feivel Cohen relates that he asked R. Yosef Shalom Elyashiv about this specific matter and R. Elyashiv cited the Chazon Ish's stance and ruled stringently.¹³ Furthermore, R. Elyashiv co-signed a *pesak*¹⁴ issued by R. Dovid Feinstein, requiring filtration, further identifying himself with this approach.¹⁵

c. Visibility when alive

While the copepods are difficult but nonetheless possible to locate when dead, when alive they present little challenge. Water samples from the reservoirs reveal creatures that can be seen swimming through the water in seemingly random directions;

11 *Shemirat Shabbat ke-Hilchetah*, *ibid.*

12. Some point out that this may not be the only way to read the *Shemirat Shabbat ke-Hilchetah*. They note that R. Neuwirth never actually states that R. Shlomo Zalman reversed his opinion but only that after some time he had heard that the Chazon Ish was stringent.

13. *Shiur* given on Sunday June 6, 2004 at the Agudath Israel of Madison. *Bedikat ha-Mazon ka-Halacha* cites this same opinion in the name of R. Elyashiv as well.

14. The *pesak* was published in *Yated Ne'eman*, on September 15, 2004 and is co-signed by R. Elyashiv and R. Hayyim Pinchas Sheinberg.

15. It is possible to argue that R. Ovadiah Yosef may indeed agree with R. Wozner and R. Auerbach's initial assumption. See *Shu"t Yabi'a Omer* YD (4:21).

it is quite clear that these specks are living beings. Rashi in fact defines a *sheretz* as a creature that is so small that it can only be detected by its movement.¹⁶ The *Ben Avraham* (50:42) adopts this definition wholeheartedly and claims that whether or not such a creature is identifiable as such after death – it is nonetheless prohibited based on its definition as a *sheretz* when alive.¹⁷ He assumes that once a prohibited status is applied to a creature during its lifetime, it cannot be removed upon death. R. Hershel Schachter adopts this position and argues that the copepods should be prohibited, since even though they are not identifiable as creatures at this stage, they are nonetheless visible.¹⁸ R. Yisrael Belsky, however, notes that the *Ben Avraham* discusses a case in which the prohibited *sheratzim* are **certainly** in the water.¹⁹ Since one cannot be certain that there are indeed copepods in New York City water without checking, R. Belsky concludes that the *Ben Avraham's* discussion is irrelevant to our situation.

d. Complete copepods versus exoskeletons

However, it is important to note that not all of the copepods that appear at the faucet are intact; a small percentage are merely the exoskeletal remains with very little or no "insides" remaining. Many *poskim* were unaware of this phenomenon

16. *Eruvin* 28a, s.v. *zir'ah*. The halacha does use the term *sheretz* to refer to larger creatures as well, such as the *shemonah sheratzim* (*Shabbat* 107a). It appears that Rashi is simply referring to the smaller types and not making linguistic generalizations.

17. Cited by *Darchei Teshuvah* (84:45).

18. His second responsum on the issue. Apparently R. Schachter assumed that the criteria of the *Ben Avraham* outweigh the apparent conclusion based on the Chazon Ish's interpretation of halachic development, especially in light of the fact that the Chazon Ish himself was stringent in this regard.

19. *Sha'ashu'ei Oraita* 3 (2004), 152.

and therefore did not respond to its ramifications. The halachot regarding *sheratzim* themselves are distinct from those governing the bones of *sheratzim*. Even if one concedes that the copepods are indeed prohibited, their bones and exoskeletons may not be. These halachot regarding the status of bones of *sheratzim* will be discussed later. It seems that something happens to these creatures during their tortuous travel that allows their muscles and viscera to disintegrate and seep out of their outer shell. It is unclear at this point what mechanism is responsible for this occurrence. Therefore, even if one were to see a speck in the water, one could not be certain that it is indeed an intact copepod; it may perhaps be only the molten exoskeleton or even dust. It would seem that in this situation the logic of the *Ben Avraham* does not apply. He assumes that all the unmoving specks are simply dead *sheratzim* that are indeed visible and identifiable when alive. However, it is simply not the case that every speck that appears in the tap water to be a creature actually was a forbidden creature when alive – a certain percentage are merely the exoskeletons.

e. Questions from the past

Lastly, it should be noted that questions of insect infestation are not modern phenomena and were probably more frequently problematic in the past. Many *poskim* discuss the status of a certain creature known as a *milbin* often found in flour. Regardless of their conclusions pertaining to the specific question at hand, they all agree that *milbin* are prohibited creatures. R. Yitzhak Bistrisky cites *Bedikat ha-Mazon ka-Halacha* as claiming that *milbin* are smaller than 200uM – smaller than most of the copepods in question. It would seem, therefore, that all these *poskim* would argue that the copepods indeed present an *issur de-oraitah*.²⁰ However, the identification of *milbin*

20. *Ohr Yisrael* 36 (2004), 203 – 204.

as a specific species seems somewhat speculative. Many *poskim* from all over the world discuss the existence of these creatures and it seems highly unlikely that they all had the same specific creature in mind. It may be that the *poskim* simply used the term *milbin* to refer to crawling creatures found in flour and did not mean to identify a specific species. If so, it is highly likely that these *milbin* were significantly larger than the copepods in question, as it seems from the responsa literature that many people found them in their produce, in contrast to the copepods that hardly anybody noticed before June 2004.²¹

II. Where do they come from?

a. *Sheratzim she-be-keilim*

21. As an important corollary, one should note that many of the *poskim* addressing the problems of 'un-filterable' water *sheratzim* counsel their questioners to first boil the water, then filter it again. For some reason they assumed that dead *sheratzim* are more easily caught by the filter. Some suggest that it might be because they assumed that the live *sheratzim* crawled through the very fine pores of their filters and when dead this would not happen. This seems highly speculative since the major force pushing the *sheratzim* through the filters is the falling water. Assuming that they were only filtering a jug or a cup at a time, the filtration itself should only take a few seconds. As such, even if the *sheratzim* could migrate to more porous areas of the filter (or even spread apart the fine fibers of the filters to create larger pores) their movement would have to be very fast (especially considering their minute size). Secondly, the locomotion of zooplankton on dry surfaces is highly questionable. Moreover, the *sheretz* would have to travel horizontally through an intense vertical gravitational force of falling water, making this movement rather difficult. Perhaps one could suggest that boiling the water killed off all the creatures and they still made it through the filters. However, since they were immobile they were not identifiable as creatures but merely as specks of dust. Since they could not identify any *issur*, they permitted the water.

The Mishnah in *Chullin* 66b discusses the halachot of permitted fish and explains that while fish require fins and scales to be deemed kosher, there are certain water *sheratzim* that are kosher even though *sheratzim* have neither fins nor scales. The subsequent Gemara (citing *Torat Kohanim* *ibid.*) explains that these *pesukim* refer to *sheratzim* that reside²² in vessels (*keilim*) and rules that *sheratzim* that reside in pits, ditches and caves are kosher despite their lack of fins and scales, since the water in these containments derives from rainfall and melting snow (these water bodies have similar characteristics to water found in *keilim*).

The Gemara continues to define two other bodies of water: *yamim u-nehelim*, seas and rivers, as well as *haritzim ve-ne'itzim*, canals and ducts. All *sheratzim* found in the former are prohibited. The water body classification of *haritzim ve-ne'itzim* is divided into two categories, *nove'im* and *moshechim*. *Haritzim ve-ne'itzim ha-nove'im* transport water from an underground water source or a spring; all *poskim* agree that *sheratzim* found therein are prohibited. *Haritzim ve-ne'itzim ha-moshechim* transport rain water or melted snow, whose flow changes with the seasons. The status of creatures found in these waters is subject to a dispute: Rambam (*Ma'achalot Assurot* 2:18) prohibits ingesting them and Rosh (*Chullin* 9:68) permits.²³ The *Mechaber*

22. The plain meaning of the Gemara seems to refer to spontaneously generated creatures. It is important to note, however, that the Gemara never actually makes this claim outright. The Rambam (*Ma'achalot Assurot* 2:18), however, uses the verb "created." The *Mechaber* refrains from this language and says *gedeilim* – the place where the creatures germinate or grow. It is beyond the scope of this paper to discuss the halachic view of spontaneous generation will be discussed only briefly later on regarding the position of the Chazon Ish.

23. The disagreement stems from a question of *kelalei ha-pesak*, of deriving principles from the Gemara. Cf. *Maggid Mishnah* (*ibid.*) and *Taz* (84:1) who use different approaches to this matter to explain

(84:2) cites the two positions by stating that “there are those who prohibit and those who permit” the ingestion of *sheratzim* found in *haritzim ve-ne’itzim ha-moshechim* without rendering a deciding opinion. *Shach* (84:8, as well as *Pri Megadim*, *ibid*) argues that since the prohibition in question stems from the Torah, we must be strict; R. Dovid Feinstein cites these *poskim* as the norm. However, the *Pitchei Teshuvah* (84:1) notes that the *Shu”t Mishkenot Ya’akov* (YD 27) disagrees and argues that the correct approach is to follow the Rosh and permit ingesting these creatures. Moreover, there is a longstanding “rule” that when the *Shulchan Aruch* presents two opinions in this manner (“some say ... and some say ...”), we always follow the latter opinion (the Rosh in this case ,who permits ingesting these specific *sheratzim*).²⁴

Before examining the various opinions regarding the reservoirs themselves, it should be emphasized that many scientific experts have agreed that the copepods breed exclusively in the reservoirs themselves and could not survive to germinate in the waters entering or exiting the reservoirs.²⁵ Therefore, the body of water in question is the reservoir; the copepods do not enter these waters from an outside source. Similarly, the only copepods found in the aqueduct system arise from the reservoirs as well, with no possible germination

Rambam’s position.

24. Cf. *Shu”t Yechaveh Da’at* (2:33) in the footnote as well as *Shu”t Yabi’a Omer CM* (6:2) for an extensive analysis of the application of this rule in several areas of halacha.

25. Dr. Edward B. Reed (communication to R. Lach cited as an appendix to his report). Dr. Reed has taught courses dealing with and conducted research on copepods for nearly fifteen years at Colorado State University. He specifically dismisses the notion that the copepods breed on biofilms growing on the inner surfaces of aqueducts, pipes and the like. Dr. Janet Reid, a research associate with the Virginia Museum of Natural History, concurred with this

along the way.

b. *Ha-yoztei min ha-tamei, tamei*

The Chazon Ish (YD 14:6) has an interesting position on the question of *sheratzim she-be-keilim*. He claims that the rules of permitted *sheratzim* cannot override the rules of *ha-yoztei min ha-tamei, tamei* – that which comes from an impure object is impure itself.²⁶ Chazon Ish argues that any *sheratzim* that are the product of reproduction of a prohibited *sheretz* are also prohibited, regardless of where they were born, reside or germinate. Since today we know that all creatures are the products of reproduction and not spontaneous generation, it seems that all *sheratzim*, even those born in vessels, should be prohibited. Many *poskim* however, dismiss this assertion categorically. They ask that according to the Chazon Ish's logic, what creatures fall under the rules of permitted *sheratzim*? There are no spontaneously generated creatures and therefore none meet these criteria; yet, it is clear that the halacha intended to discuss real phenomena (at least in this case).²⁷ However, it seems safe to assume that the Chazon Ish was aware of this problem and nonetheless thought the way he did – perhaps he had an answer to it that he did not record, or the question simply did not bother him, we will never know. While it seems a rather weighty position to ignore, such has been its fate.

c. *Ma'ayanot and comparison to hilchot mikva'ot*

conclusion.

26. Chazon Ish, *Hilchot Tola'im* 14(1):10.

27. Several answers have been suggested for this question. Many *poskim* believe that since halacha is unconcerned with subvisual phenomena, if the newborn *sheretz* is so small that it cannot be seen, the adult has the status of germinating from nothing (visual = halachic). Others claim that perhaps at another historical period there were

Assuming the Chazon Ish's position is indeed ignored, the major question facing the *poskim* is how the reservoirs fit into this picture. Various positions have been proposed spanning the entire spectrum of options. The seemingly simplest approach is to recognize that the rivers and creeks that feed the reservoirs stem from natural springs (*ma'ayanot*) and as such have the status of *nehalim*, with all *sheratzim* growing therein prohibited. With respect to this approach, R. Dovid Feinstein notes that the reservoirs should not be considered *borot*, (cisterns, that have the same halachic status of *keilim*), since they have both an inlet and outlet.²⁸ Second, R. Feinstein posits that although the movement of water within the reservoir cannot be perceived (only determined) and the great majority of the water seems immobile, nonetheless, since it originates from springs and is destined to leave, it must qualify as *yamim u-nehalim*.

In the context of *mikva'ot* as well, halacha differentiates between naturally occurring springs, *ma'ayanot*, and collected rainwater. *Shu"t Mishkenot Ya'akov* (YD 45) and others use parallel definitions of water bodies in both these areas, using the more elaborate and heavily discussed *mikva'ot* definitions and applying them to the rules of ingesting *sheratzim*. As in *mikva'ot*, the source of the water is one of the deciding factors in determining the status of a subsequent body of water, giving the reservoirs the status of *ma'ayanot* and prohibiting the copepods.

Although all springs ultimately derive their water from rainfall and melting snow absorbed by the mountain, transported via aquifers, collected and ultimately projected as a spring, halacha distinguishes between these two bodies of water. *Shu"t*

28. R. Feinstein's ruling as noted previously. *Shu"t Chatam Sofer* (EH 2:30) claims that a body of water that has only an outflow is still considered to be as *yamim u-nehalim* despite the incomplete parallel to actual rivers.

Mishkenot Ya'akov (ibid) explains that once the water is absorbed by the mountain and transported some distance it loses its definition as rainwater and is "reborn" as a spring.²⁹ The Netziv³⁰ quantifies the distance that water must travel to be reborn as a spring as at least four *amot*, while the *Tzemach Tzedek* (Lubavitch) requires a distance of at least 100 *amot*.³¹ Ramban (*Bereishit* 26:17) claims that this was the very disagreement between Yitzhak Avinu and the shepherds of Gerrar.³² Since the lion's share of the reservoir contents derives from these sources,³³ it would seem that all copepods residing within are forbidden.^{34,35}

29. If we do not accept this proposition then there is no such real *ma'ayan* in the world today since all springs ultimately derive their water from rainfall. While *Darchei Teshuvah* YD (201:215) cites many authorities that argue on the conclusion of the *Mishkenot Ya'akov* in this particular case, they all agree to this premise at least on some level.

30. *Shu"t Meishiv Davar* 41.

31. *Shu"t Tzemach Tzedek* YD 176.

32. Also see Ramban to *Devarim* (8:5) where he explicitly defines *ma'ayanot*.

33. There is some contribution by direct rainfall into the reservoir itself, but it pales in significance to the contribution from the rivers flowing into it.

34. Some have cited *Shu"t Meishiv Davar* (2:28) in opposition to this proposition. He states the halacha that if the *sheratzim* (in the river in question) derived from snow or cisterns, they are permitted even when they enter the river. If he meant that the water in question originally derived from rainwater – then he has effectively included every single body of water on earth and eliminated the halachot of *ma'ayanot* and of forbidden *sheratzim*. Thus, it seems more likely that he simply referred to snow that melted directly into the water without first travelling underground and in effect did not add anything new with this line.

35. For a comprehensive treatment of this topic, see *Sefer Tahorat Mayim* by R. Nissan Telushkin, pp. 7 – 9.

d. *Sheratzim* as components of the water

R. Yitzhak Raitport argues and assumes that all *sheratzim* should take on the status of the substance from which they derive.³⁶ He tries to prove this from the Gemara in *Avodah Zarah* 12b that explains that a person should not drink water from *neharot* (rivers) at night since there is a danger of swallowing leeches (that he may not be able to see).³⁷ The obvious question is that a person should not drink from *neharot* at night since he might consume *sheratzim* – even those that are not dangerous! Why is the prohibition merely explained as a safety feature and not as a problem of consuming forbidden *sheratzim*?³⁸ *Shu"t Maharam Shik* (OH 134) explains that the Gemara is referring only to rivers in which creatures are not prevalent and there is little or no possibility of ingesting any *sheratzim*.

R. Raitport claims that it is unlikely that the Gemara in *Chullin* (that explains that *sheratzim* in *keilim* are permitted whereas those in *neharot* are forbidden) refers to *neharot* where creatures are prevalent while the Gemara in *Avodah Zara* refers to *neharot* without a significant creature population. He prefers to explain

36. *Kuntres*, pp. 20 – 22. He actually makes several other points as well regarding this matter, based on the mistaken notion that the reservoirs derive entirely from rainfall. As discussed earlier, each reservoir has rivers that lead into it and as such these arguments will not be analyzed.

37. Quoted by the Rambam in *Rotzeach u-Shemirat Nefesh* 11:16 and *Shulchan Aruch Choshen Mishpat* 427:9.

38. It is important to note that the *Issur ve-Heter* (41:7) cites the Rambam differently as referring to *bereichot*, enclosed bodies of rainwater and not *neharot*. As mentioned above, the creatures residing in the former are permitted and therefore at night there is only a problem of danger and not prohibition. This variant text does not appear in any modern edition of the Rambam nor is it cited as an alternate version in the Shabtai Frankel edition.

that there are two types of water *sheratzim*: those that are created from the water and those created from the land or air and that later migrated into the water; the former are permitted and the latter clearly prohibited. The only problem of water creatures in *mayim ha-nove'im* is that we suspect that they may have been created on (from) the land and migrated into the waters. He claims a parallel structure in *Chullin* 77b regarding *sheratzim* that grow on (from) animals and fish, that have the same status of the animals and fish at that moment. Lastly, he argues that this logic is found in *Shu"t Tzemach Tzedek* (YD 62) where he raised a separate possible leniency for some type of *sheretz* found in a river, but nonetheless concluded stringently, since he was concerned that the *sheratzim* were created on (from) the ground or air and later entered the water. R. Raitport contends that from this language, we can conclude that the *Tzemach Tzedek* would agree that if the *sheratzim* were created from the river itself they would be permitted, as per his previous contention.

This approach is rather novel and does not seem to have any precedent in the *poskim*. Secondly, it is unclear who is the "speaker" at this point in the responsum of the *Tzemach Tzedek*. The text in question appears in the question segment (before the words "here ends the question") but in parentheses, raising the possibility that it was the *Tzemach Tzedek* himself who added this possible leniency into the question. For this reason alone, it would not seem prudent to base leniencies on this logic. Lastly, it seems at best to be an attempt to provide a coherent logic behind a somewhat obscure Torah law – *doresh ta'ama de-ker*. The halacha, however, follows R. Yehudah that we do not attempt to provide such reasoning, let alone use it as a basis for leniencies.³⁹

39. *Bava Metzia* 116a. Both Rambam (*Malveh ve-Loveh* 3:1) and *Mechaber* (CM 97:14) rule like R. Yehudah who denies this

e. Non-*mikva'ot* definitions of water

There is an alternate approach to the notion that denies the continuous definition of a *ma'ayan* from *hilchot mikva'ot* to *hilchot tola'im* (insects). R. Yehoshuah ha-Kohen Perachyah⁴⁰ claims that still waters collected in a cave should have the status of *mayim she-be-keilim* even though water flows into this area from a natural spring. Since the water is currently not in a *ma'ayan* but rather in a collected reservoir, the halacha should categorize all creatures within that water as arising from *mayim she-be-keilim*, since the connection to the spring is irrelevant. In contrast, in *hilchot mikva'ot* the source of the water and the manner in which it arrives at its final destination are of utmost importance. R. Perachyah further claims that since it is unlikely for flowing water to contain small creatures, we can assume that they germinated and grew only in the collected waters of the reservoir.⁴¹

The previously mentioned experts adamantly reject the notion that the copepods in the New York City water system live in the rivers that feed the reservoirs, but maintain that they exist solely in the reservoirs themselves. Accepting his position would therefore posit categorically that the copepods are permitted. R. Yisrael Belsky independently arrived at a similar conclusion, noting that the water outflow from the Hillview reservoir is under human control. As such, it should be considered a *bor*, since the water does not freely flow through it. He ultimately

rationalization process. *Shu"t Chatam Sofer* (YD 254), however, is willing to use such rationales to establish a stringency.

40. *Sefer va-Yikra Yehoshu'a*, YD Hilchot Tola'im 2.

41. While he concludes that it is nonetheless appropriate to act stringently, it seems that it is out of concern that the *sheratzim* actually originate in the *ma'ayan* waters.

declares that the copepods present no halachic concern.⁴²

f. The status of *sheratzim* once they leave their original habitat (*sheratzim she-pirshu*)

Even if we assume that the waters in the reservoirs are of the type that spawn permitted *sheratzim*, the Gemara in *Chullin* (67b) explains that this permission applies only to these *sheratzim* in their original habitats. Once the *sheratzim* leave their original permitted habitat and enter a body of water whose inherent *sheratzim* are forbidden, the migrating *sheratzim* also become forbidden. The Rashba explains that the original habitat is limited to the *kli* in which they germinate as well as its inner surfaces; migrating to the outer surface of that same *kli* renders them forbidden.⁴³ Therefore, once the *sheratzim* leave one permitted water body, such as a *bor*, and enter a *kli* (where the *sheratzim* would be permissible to eat if they had originated and remained there) they are nonetheless forbidden. The *Beit Yosef* argues that a *sheretz* going from one *kli* to another should not create any difference in halachic status, and the only change in status should arise when they are migrating between two different categories of water.⁴⁴

g. The status of *sheratzim* in their new environment

There is a three-way disagreement as to the status of the inside of the new *kli*. The *Shach* (84:4) claims that while the

42. *Sha'ashu'ei Oraita*, 155 – 156. He notes that there are many gates that control the outflow of water from this reservoir, with each independently controlled. There are therefore no gates that are open continuously for longer than a specific given period.

43. *Torat ha-Bayit ha-Katzar* (3:1) [67b in the Warsaw edition], see *Shulchan Aruch* YD 84:1.

44. *Beit Yosef* YD (84) s.v. *katav ha-Rambam*, also see *Taz* (84:5) and *Shach* (84:4, 10).

sheratzim are in the water of the *kli*, they are permitted. However, once they migrate to the walls of the vessel (*kli*), they become forbidden. The *Taz* (84:5) argues that the insides of the new *kli* are exactly parallel to the water inside the *kli*, and therefore if the *sheratzim* migrate to the walls they are still permitted. The *Issur ve-Heter* (as understood by the *Pri To'ar*) argues that once the *sheratzim* enter the *kli* they are forbidden, whether or not they migrate anywhere. (The fact that these *sheratzim* are dead at this point will be discussed below.) Regarding an aqueduct leading from a *bor* to a *kli* (under an open faucet), R. Shmuel Wozner claims that the *Issur ve-Heter* will clearly prohibit and the *Taz* will permit all of the *sheratzim*.⁴⁵ He explains that the *Shach's* position would depend on whether or not the aqueduct is filled with water or whether there is space within the tube for the *sheratzim* to migrate to the sides of the walls. He posits that if the water reaches only half the vertical height of the aqueduct, then we must be concerned that the *sheratzim* migrated onto the walls and the *Shach* would prohibit these *sheratzim*.⁴⁶

R. Chayim Oberlander points out, however, that there is additional room for leniency in our case since almost all of the copepods are killed before they enter the aqueduct systems.⁴⁷ The Rambam (*Ma'achalot Assurot* 2:16) claims that postmortem "migration"⁴⁸ is considered regular migration and the *sheratzim*

45. *Shu"t Shevet ha-Levi* YD (7:123:4).

46. R. Wozner posits that since the prohibition in question is from the Torah we should adopt the *Issur ve-Heter's* stringent position. He points out, however, that the *Pri Megadim* (*Mishbetzot Zahav* YD 84:5) attempts to prove that the *Issur ve-Heter* really has a similar logic as the *Taz* and is not quite as extreme as the *Pri To'ar* attempted to show. Therefore, ideally we should follow the *Pri To'ar's* approach, but he is readily willing to be more lenient in certain situations.

47. *Ohr Yisroel*, p. 178.

48. "Migration" means any movement of *sheratzim* from their natural habitat, be it by voluntary motion or water currents.

are therefore forbidden, while the Rosh (ibid 3:68) disagrees and concludes more leniently.⁴⁹ The *Mechaber* (84:4) cites the Rosh as the standard opinion and mentions that "some say" (*yesh omrim*) to follow the Rambam. R. Oberlander argues that there are several reasons to conclude leniently in this matter. Firstly, there is a longstanding rule that when the *Mechaber* quotes one nameless opinion and the second opinion as *yesh omrim*, we always follow the former opinion.⁵⁰ The *Shach* (84:12) independently arrives at the lenient conclusion as well.⁵¹ Secondly, the impetus for stringency in the previous question is the position of the *Shach*. He himself, however, is of the opinion that postmortem migration is meaningless! Therefore, even if we are to follow the *Shach's* strict approach above, it is not relevant to our case because of the *Shach's* lenient opinion with regard to ingesting *sheratzim* that migrated postmortem. R. Oberlander notes, however, that the *Minchat Ya'akov* (46:13) and *Pri Megadim* conclude strictly in this latter issue (like the Rambam) and therefore there is little room for lenient maneuvering.⁵²

49. The *Maggid Mishnah* explains that they disagree about the text of the Gemara in question, which seems to conclude that we should act strictly. The Rambam read "*pirshah meitah*," meaning that the *sheretz* migrated post mortem, while the Rosh read "*pirsha u-meitah*," it migrated and, upon impact, died.

50. For a thorough and rather extensive treatment of this issue see *Yalkut Yosef* 9, pp. 5 – 44, and the opinion of R. Benzion Abba Sha'ul quoted therein.

51. Although the Ramo does not comment on this point in the *Shulchan Aruch*, the *Shach* does quote the Ramo's opinion in *Torat Chatat* (46:5, 47:2) as concluding like the Rosh.

52. While R. Oberlander does not cite a source for the *Pri Megadim*, it seems to be *YD Siftei Da'at* (84:12, 24, 45). It seems unclear whether the *Pri Megadim* is endorsing the *Minchat Ya'akov's* opinion or simply mentioning his approach and explaining how it applies.

h. Application

The application of these regulations hinges upon the halachic definition of the reservoirs and the aqueduct system. If both are considered *keilim*, then there is no question of migration at all if we assume that the copepods are considered *sheratzim she-be-keilim* and therefore permitted. If the reservoir is considered a *bor* and the aqueducts considered *keilim*, the status of the copepods is subject to dispute between the *Issur ve-Heter* and the *Taz*. R. Yitzhak Raitport adopts the former approach and contends that the reservoirs and the entire water delivery system, including all aqueducts, tunnels, pipes and passages, have the status of one tremendous *kli*; thus, the copepods cannot be deemed to have migrated from one category of water to another and accordingly, ingesting them should be permitted.⁵³ R. Yitzhak Bistrisky counters that this assertion is simply fantastic requiring a large stretch of the imagination!⁵⁴ On a more halachic plane, *Shu"t Remet"z* (YD 30:5) argues that a *kli* that is firmly attached to the ground (such as the aqueducts) receives the status of the ground itself, giving the creatures inside this *kli* a status of *sheretz ha-aretz* that are always prohibited regardless of migration. Further consideration is needed regarding the status of the water in Staten Island, due to the tremendous water tank that temporarily holds the water before it is distributed.

III. Bones of a *sheretz*

As mentioned previously, experiments have shown that sometimes what at first appear to be copepods are in fact only

53. The status of a *sheretz* that exits one *kli* to enter another is permitted (as per *Shach* YD 84:4). Therefore, there are no problems with the water exiting the faucet and entering any other vessel.

54. *Hasagot*, no. 5.

the exoskeletal remains ('ghosts') of these creatures. *Torat Kohanim* (*Shemini* 3:4:10) explains that bones and fins of *sheratzim* are not forbidden, unlike their fleshy substance, *basar*. Later, however, the *Torat Kohanim* expounds that a *kelipat ha-sheretz* is forbidden, a term that does not occur often in halacha and is somewhat ambiguous; normally *kelipah* means shell or peel (such as of a fruit). A likely physiological structure of *sheratzim* that fits this description seems to be the exoskeleton, which would render both intact copepods as well as their exoskeletal remains prohibited. As noted above, *poskim* have generally not yet addressed this issue and will have to analyze this question as well.

Even if we assume that the exoskeleton qualifies as bones, it is not immediately apparent that it should be permitted. Although the question of *sheratzim* bones similarly does not occur frequently, a parallel question concerning eating bones of non-kosher animals does play prominently in halachic analysis. While the *Torat Kohanim* (*ibid*, 2:4:8) makes a similar permissive claim regarding the consumption of non-kosher animal bones, the Rambam (*ibid* 2:18), as understood by R. Yechezkel Landau, explains that they are nonetheless rabbinically prohibited.⁵⁵ R. Chayim Ozer Grodzinsky claims that this rabbinic prohibition applies only to soft bones containing marrow; hard, dried bones are entirely permitted.⁵⁶ This permission flows from the *Shibbolei ha-Leket's* claim (2:34, quoted in Ramo *YD* 87:10) that a dried-out stomach of a cow loses its status as meat regarding prohibitions of mixing it with milk. While R. Landau tries to differentiate between the status of a properly slaughtered cow's stomach (permitted on its own and only prohibited when mixed with milk) and an

55. *Tzelach*, *Chullin* 89b, s.v. *sham ve-noheig* (first entry). Also see *Shu"t ha-Bah* 137.

56. *Shu"t Achi'ezer* 3:33.

intrinsically prohibited stomach, R. Ovadiah Yosef (*Yabi'a Omer* YD 8:11) explains that the *Shibbolei ha-Leket* explicitly rejects such a distinction and that R. Landau perhaps did not have access to an actual copy of the *Shibbolei ha-Leket*.

R. Ovadiah Yosef points out that the *Mechaber* (YD 99:1) does not distinguish between different types of bones, and therefore we are to assume that all are permitted regardless of their rigidity.⁵⁷ R. Aharon Kotler, however, contends that the *Mechaber* concludes as does Rambam, that the bones are rabbinically prohibited.⁵⁸ The *Mechaber* seems to categorically permit all bones since he is only referring to cases of bones in mixtures (where the bones of an *issur* are added to the volume of permitted substances to calculate the total quantity of *heter*). R. Kotler claims that even the *Mechaber* admits that eating non-kosher bones by themselves or when added deliberately to a kosher mixture to derive benefit from them, is rabbinically forbidden. R. Eli'ezer Yehudah Waldenberg agrees with R. Ovadiah Yosef's analysis (in rejecting a similar prohibitive argument by R. Yechezkel Abramsky) to permit these bones.⁵⁹

IV. Do the copepods form a mixture with the water (*ta'arovet*)? If so, what is its status?

a. *Hilchot Ta'arovet*

Halacha postulates the concept that one object can become nullified, *batel*, in a larger quantity of another. Therefore, if a spoonful of milk fell into a pot of meatballs cooking on the

57. As per the Rashba's opinion in *Torat ha-Bayit ha-Aroch* (4:1) [109a in the Warsaw edition].

58. *Shu"t Mishnat Rabbi Aharon*, YD 17:17 (also 16:9).

59. See *Shu"t Tzitz Eli'ezer* 4 where R. Abramsky's position is recorded along with R. Waldenberg's disputing comments.

fire, but there were 60 times more meat than milk in the pot, the mixture is permitted.⁶⁰ There are different sets of halachic rules governing different types of mixtures. Our present discussion will deal primarily with cases of liquids mixing with liquids, *lach be-lach*, and solid objects mixing with liquids, *yavesh be-lach*, which require 60 times more of the permitted item to permit the mixture.⁶¹ In most of the discussed cases, the halacha describes situations in which the *issur* item is entirely lost within the permitted substance and, therefore, the *entire* mixture is permitted. But what is the status of a mixture (*ta'arovet*) in which the *issur* is still identifiable, *nikkar ha-issur*?

b. Nikkar ha-Issur

The standard assumption is that when the *issur* is identifiable, there is no *ta'arovet* proper, since the substances are not really mixed. Many *poskim* claim that when an *issur* is *nikkar* in a *ta'arovet*, it is never *batel* even on a Torah level, presumably since it is not considered a *ta'arovet*. This is the approach of the *Taz* (104:1) as explained by *Minchat Kohen* (*Sefer ha-Ta'arovet* 2:3) and adopted by *Pri Chadash* (104:3) and *Minchat Ya'akov* (22:23, 85:57). The *Minchat Kohen* provides an alternate reading of the *Taz* that would hold that even if the *issur* is not *nikkar* at all, but can nonetheless be removed, it is not *batel* even on a Torah level. This opinion is endorsed by *Shulchan Aruch ha-Rav* (*ibid*).

Nevertheless, other *poskim* address this question differently. The *Ramo* (YD 98:4) says that if forbidden fat fell into a large quantity of food (where there was 60 times as much food as fat), one must first add water to the mixture so that the fat will rise to the top and be removed.⁶² Only after doing so is the flavor of the fat *batel* in the rest of the mixture.⁶³ *Pri Megadim*

60. *Shulchan Aruch*, YD (92:2).

61. *Shulchan Aruch*, YD (98:1).

(YD *Mishbetzot Zahav* 98:7) explains that the fat is not *batel* because it is considered to be identifiable and therefore, the prerequisite for *bitul*, namely the creation of a mixture, *ta'arovet*, has not been satisfied (even) on a Torah level. The *Kreiti u-Feleiti* (ad loc.) "argues" and explains that the fat is not *batel* because the mixture has a method of becoming permitted, a *davar she-yesh lo matirim*. Since if a person would simply remove the fat, the mixture would be permitted anyway, the halacha does not allow *bitul* to occur in such cases.⁶⁴ The concept of *davar she-yesh lo matirim* is of rabbinic origin, implying that on a Torah level, even if the *issur* is still visible within the *ta'arovet*, it is nonetheless *batel*.

c. *Sha'arei Yoshel's* approach

The *Sha'arei Yoshel* (3:19) explains that this fundamental disagreement regarding the status of a *ta'arovet* where the *issur* is visible is prevalent in other contexts. The Rashba (*Torat ha-Bayit ha-Katzar* 4:4 [38a in the Warsaw edition]) discusses a case in which a pot in which something non-kosher was cooked forms a *ta'arovet* with other kosher pots (the person does not

62. R. Belsky (*Sha'ashu'ei Oraita*, 153) argues that the Ramo's position is entirely irrelevant to the question of copepods since the Ramo refers to a case where the forbidden fat is **certainly** in the *ta'arovet*. The certainty that the *issur* is present results in certain consequent stringencies. As noted earlier, since the copepods are only **questionably** in each glass of water, the Ramo's conclusion is irrelevant to our discussion.

63. The Gemara *Chullin* 97b (recorded *Shulchan Aruch* YD 98:4) explains that since we cannot ascertain how much flavor is given off by any item, we always assume that the maximum possible exuded flavor equals the volume of the item in question.

64. This logic follows the reading of Rashi in *Beitzah* 3b, s.v. *she-yesh*. The Ran in *Nedarim* 52a, s.v. *ve-kashya*, however, provides an alternate and fascinating approach to the concept of *davar she-yesh lo matirin*.

know which pot is forbidden, but is certain that there is one such pot). Each pot is *nikkar* on its own and instead of permitting the entire stock, the person can merely "*kasher*" all of them. R. Shkop argues that the Rashba presumes that a *ta'arovet* where the *issur* is *nikkar* is only prohibited qua *davar she-yesh lo matirim*. Therefore, since there is much toil and expended effort required to "*kasher*" the entire supply of cookware, the halacha renders the entire *ta'arovet* permitted. The Ra'ah however (*Bedek ha-Bayit*, ad loc) argues that since the forbidden pot is *nikkar* (since whichever pot is forbidden, it is clearly visible) the entire *ta'arovet* is forbidden until every pot is "*kashered*." R. Shkop explains that the Ra'ah believes that a *ta'arovet* in which the *issur* is *nikkar* can never become *batel* even on a Torah level. Therefore, he is unconcerned with the amount of effort required to bring about a permissive situation. While this case is somewhat different than the status of copepods in the water (the pots are *yavesh be-yavesh, min be-minoh*, while the copepods in the water are *yavesh be-lach, min be-she-eino minoh*), it seems that R. Shkop assumes that these two approaches are valid in all realms of *bitul be-ta'arovet*. R. Chayim Oberlander (ibid, p. 152) argues that since the *Shulchan Aruch* (YD 102:4) follows the opinion of the Rashba, it must be the halachic conclusion that a *ta'arovet* in which the *issur* is *nikkar*, is *batel* at least on a Torah level. This would mean that the copepods are considered *batel* in the water as far as the Torah is concerned and we are left with the rabbinic strictures of *davar she-yesh lo matirim* and possibly of *biryot* (to be discussed later), both inhibiting *bitul* on a rabbinic level.^{65,66}

65. The *Shulchan Aruch*, however, may not be quite that unambiguous. The *Mechaber* says that although normally a *davar she-yesh lo matirim* prevents *bitul* (albeit on a rabbinic level), when application of the *matir* requires a *tircha yeteirah* (extra expended effort), the rabbis suspended their decree and allowed *bitul* to proceed as it would have normally. This does not outwardly contradict the opinion

d. *Divrei Chayim's* approach

When asked about the permissibility of a certain bug-infested water source, *Shu"t Divrei Chayim* (YD 54) cited an alternate paradigmatic case to prove that whenever the *issur* is *nikkar*, it is never *batel*. The Rambam (ibid 3:15) and Rashba (*Torat ha-Bayit ha-Aroch* 3:6 [90b in Warsaw edition]) disagree regarding the permissibility of semi-solid butter obtained from a non-Jew, since the Gemara postulates that milk from non-kosher sources cannot form butter (the concern is that the *kum she-ba-chem'ah* (semi-liquid accompaniment) contains both kosher and non-kosher milk). The Rambam is strict despite this limitation, because the *kum she-ba-chem'ah* is *nikkar* on its own and therefore cannot form a functional *ta'arovet*. The Rashba is lenient as he claims that even solid objects that are individually identifiable can become *batel* amongst other solids in an appropriate volume. The *Beit Yosef* (YD 116) reads these two opinions as claiming that since nothing can be positively identified as *assur* – the *issur* is *batel* nonetheless.

The *Divrei Chayim* posits that the disagreement between the Rambam and Rashba involves cases where the *issur* is *nikkar* but cannot be identified and removed (such as creatures that flowed through "contemporary" filters) and even in such cases the Rambam is stringent.⁶⁷ The *Divrei Chayim* proceeds to

of the Ra'ah since he will claim that the *Mechaber's* argument is correct, albeit limited to cases where the *issur* is not *nikkar*. Since the *Mechaber* did not openly contend that the *issur* was indeed *nikkar* in this case, it seems difficult to conclude what his position is on this matter.

66. The *Sha'arei Yosher* also brings proofs from a certain halacha relating to a *ta'arovet* of permissible and forbidden *sechach*, in which the *Mechaber* also seems to adopt the lenient position. However, the rest of the piece in *Sha'arei Yosher* is devoted to explaining why the case of *sechach* may not be paradigmatic for the rest of halacha. It seems difficult to conclude from these cases that the *Mechaber* actually held this lenient position.

prohibit the water he was questioned about and goes so far as to say that if a person could move to a location that is free from these troubles and does not do so, he is considered to be intentionally violating the prohibition, *meizid*, and prohibited from drinking the water even for *pikuach nefesh*!⁶⁸

67. He cites a *Shu"t ha-Rashba* (84 [unclear which responsum he refers to]) who says that regarding a *chatichah ha-re'uyah le-hitkabad bah*, one must search for the *chatichah* and remove it in order to permit the *ta'arovet*. The *Divrei Chayim* explains the disagreement between the Rambam and Rashba in this way so as to insure no inconsistencies between the Rashba in this responsum and his opinion in *Torat ha-Bayit*.

68. There are two points however, that require clarification before applying the *Divrei Chayim's* approach to the copepod question. The Rambam does not unequivocally adopt the position attributed to him; he cites some of the *Geonim* (*miktzat Ge'onim*) who were stringent and some who were lenient, although the *Divrei Chayim* assumes that Rambam adopts the former position. In the next halacha, the Rambam claims (*yir'eh li*) that if all the milk were boiled off then the butter would be permitted – indicating that he follows the stringent opinion. Since the Rambam does not explicitly make this claim, it is quite possible that he is saying that even for those who are stringent, boiling off the excess milk should alleviate the problem, without offering his own opinion on the matter. A rabbinic decree (*gezeirah*) is enacted to protect people from a possible violation of Torah law. Perhaps the disagreement among the *Geonim* revolves around the disagreement between the Rambam and the Rashba. Those who favor the Rashba's opinion (an *issur* that is *nikkar* is *batel* on a Torah level) will not enact a *gezeirah* to "protect" violation of another rabbinic prohibition. Uncharacteristically, the *Mechaber* (*Shulchan Aruch* YD 115:3) is similarly ambiguous. He states that one should not protest against the lenient practice in this matter; however, if the majority of the community acts stringently, then one should not deviate from the common practice. The normative decision does not seem to be in accordance with the stringent opinion but rather dependent on local custom. Moreover, the *Tzemach Tzedek* (*Shu"t Tzmach Tzedek* YD 70, arguing on his grandfather in *Shulchan Aruch ha-Rav* (466:9)), argues that the Rambam's opinion is an extreme stringency (*chumra gedolah*)

e. *Torach Gadol*

The question according to R. Shkop's approach turns on how to define *torach gadol*. Based on *Chazon Ish* (YD 14:6), R. Vaye points out that the term *torach* is defined as difficulty in actually identifying the *issur*, as opposed to difficulty in merely finding it – as is the case by the copepods. He concludes that (aside from the question of *biryah*) such creatures should be *batel*.⁶⁹ Furthermore, it seems logical to assume that whether or not one object can become *batel* in a mixture is independent of advances in modern technology. The impression given by the halachot of *Issur ve-Heter* is that *bitul* is not a scientific phenomenon, but rather one mandated by the Torah. As such, it seems reasonable to assume that if in the past an object could not be removed and was deemed *batel*, the same criteria

and is not necessarily halachically mandated.

Second, the proof from the *Shu"t ha-Rashba* does not definitively apply to the copepods. By a *chatichah ha-re'uyah le-hitkabad bah*, the *issur* is identifiable as such – you can look at the piece in question and state that this piece is pork. As mentioned previously, the copepods are not [easily] identifiable as such. Often a microscope is needed to positively distinguish a copepod from a speck of dust and is definitely required to specifically distinguish full copepods from their exoskeletal remnants. R. Moshe Vaye (*Bedikat ha-Mazon ka-Halacha*, chapter 7 footnote 1) cites both R. Shlomo Zalman Auerbach and R. Yosef Shalom Elyashiv as positing that something that is not a *biryah* and cannot be positively identified without much toil (*torach gadol*) is *batel* in a *ta'arovet*. While the intact copepods do present a problem of a *biryah* (to be discussed) that would only prevent *bitul* on a rabbinic level, having already become *batel* on a Torah level. Moreover, a careful reading of the *Shu"t Tzemach Tzedek* (YD 70) reveals that he indeed agreed to this proposition as well. The question he dealt with concerned fragments of creatures that could not be filtered. After rejecting the Rambam's opinion as unnecessarily stringent, he claims that these creatures should be *batel* because they are not recognizable as *biryot*. He could have, but does not say, that they are *batel* because they are not *biryot*, but rather because they are not **recognizable** as *biryot*. This also seems to be the position of *Iggerot Moshe* YD (4:2).

should apply today. R. Vaye seems to be pointing out that *torach* fits into this very scheme – it is the ability to identify the *issur* that is determining, not the technical ability to remove it. This also seems to be the thrust of the *Tzemach Tzedek's* argument (ibid) as well.

R. Bistrisky takes the opposite approach and argues that *torach* is defined as the amount of physical effort needed to remove an object from a *ta'arovet*.⁷⁰ There is no more effort required to turn on a faucet running through a filter than to turn on an unfiltered faucet. As such, even according to the *poskim* cited above, this is a case where there is no *torach* required at all and therefore the copepods are not *batel*.⁷¹

V. Bitul of a Biryah

a. Bavli

The Gemara in *Chullin* 100a (as explained by Tosafot ibid.

69. *Bedikat ha-Mazon ka-Halachah*, ibid.

70. *Ohr Yisrael*, p. 212.

71. The *Avnei Nezer* (YD 81) offers an additional interesting point of leniency. When a person knows that water may contain *sheratzim*, drinking that water and ingesting those *sheratzim* is not categorically considered to be *mit'asek* (a prohibited action committed in the midst of a permitted one with no intention of committing the prohibited action), but rather willful violation (discussed by R. Shlomo Zalman Auerbach in *Shu"t Minchat Shlomo* 2:61:1). The *Avnei Nezer*, however, notes that perhaps one could argue that the water surrounding the *sheretz* prevents the *sheretz* from actually coming in contact with the person's throat (*chotzetz*). Although one food item cannot act as a *chatzitzah* for another food item, he suggests that perhaps a liquid in fact can act as such a *chatzitzah* (he claims to be unsure as to this last point and as such will not rely on it entirely). Since the probability of a *sheretz* actually coming in contact with the throat is remote, the water should be permissible. He claims that even if one were to ingest a *sheretz* in this matter (that it would touch the throat), since it is only a remote possibility that it will do so (not a *pesik reishei*), it is

s.v. *biryah*) posits that an *issur* that is a complete creature, a *biryah*, cannot be *batel* in any mixture regardless of the quantity (codified in *Shulchan Aruch* YD 100:1). A priori, this hindrance to the normal rules of *bitul* exists because a *biryah* is considered an entity onto itself, an object whose identity cannot be negated among other items and hence never *batel*.⁷² Most *poskim* assume that this *bitul* prevention is of rabbinic origin but that the item could be considered *batel* on a Torah level.⁷³ The Maharil, however, attempts to prove that Tosafot may have assumed that a *biryah* is not *batel* even on a Torah level.⁷⁴ The *Pri Chadash* (100:3) notes, however, that this seems to contradict Tosafot's position in many places in the Gemara. Moreover, the "proof" from Tosafot is a rather forced interpretation, and he notes that the general consensus in fact is that Tosafot also held that the prevention of *bitul* by a *biryah* is of rabbinic origin.

b. Yerushalmi

The *Yerushalmi Terumot* (10:5), however, as understood by R. Shimshon of Shantz (*ibid*) argues that a non-kosher fish can be *batel* in 960 kosher fish, despite its status as a *biryah*.⁷⁵ This claim is in apparent contradiction to the Gemara (*Bavli*) in *Chullin*. The *Ohr Zaru'a* (4:264) cites an explanation by R. Nissim Gaon that reinterprets the *Yerushalmi* to refer to the exuding

considered an unintended action (*davar she-eino mitkaven*).

72. An alternate, subtler, approach is to argue that a *biryah* cannot even form a *ta'arovet* with other substances. Since its identity is always retained, the mixture of the *biryah* with other substances is not defined as a mixture but as two unmixed separate objects.

73. Cf. Rambam *ibid.* (16:6).

74. *Shu"t Maharil* (76), based on Tosafot, *Bava Metzi'a* 6b, s.v. *kafatz*.

75. The *Shu"t ha-Rashba* (1:271) already notes that he does not understand the requirement of specifically 960. While it mathematically comes out to be 16 x 60 (60 being the "magic" number in *Hilchot ta'arovet*), this function does not seem to have any other

flavor, *ta'am* of the non-kosher fish. He claims that the non-kosher fish as a *biryah* is never *batel* (as per the Gemara *Chullin*), but its *ta'am* can be *batel*, but only in 960. The *Ohr Zaru'a* himself, however, disagrees with this claim and argues that even for the *Bavli*, while the fish itself is never *batel*, if it were removed, its *ta'am* would be *batel* in 60 like the *ta'am* of any other *issur*. This opinion is agreed to by *Shulchan Aruch* YD (100:2).

The Ra'ah⁷⁶ cites the Ramban for a similar but more limited application, that although the *ta'am* of "regular" *issurim* is *batel* in 60, certain sharp *te'amim* require a larger quantity. He argues that the *Yerushalmi* is referring not to the fish itself, but to the juicy substance of the fish, *tzir dagim* – a sharp *ta'am* that is not *batel* in 60. The Rashba⁷⁷ agrees with R. Shimshon of Shantz and the *Ohr Zaru'a* and explains that since the halachot of *biryah* are only of rabbinic origin, he will not be stringent in an apparent disagreement between the Talmuds.

While this opinion is not cited by the *Shulchan Aruch*, many *poskim* are willing to incorporate the Rashba's opinion in forming decisions in association with other criteria as well (e.g. using this as a *safek* to form a *sfek sfeika*). There are *poskim* who are even willing to create *sfek sfeikot* even when both presumptions are against the normative position of the *Shulchan Aruch*.⁷⁸ Moreover, the *Ketav Sofer* argues that when the *biryah* is *pegumah me'atzmah*, inherently foul, perhaps similar to the chlorinated copepods, even the *Shulchan Aruch* would agree that it can be *batel* in a mixture of one to 960.

c. Intact and identifiable creatures

correlation in halacha.

76. *Bedek ha-Bayit*, Bayit 4, *Sha'ar* 1 (14a), s.v. 'od.

77. *Torat ha-Bayit*, *ibid*, and *Shu"t ha-Rashba* *ibid*.

78. Cf. *Machazik Berachah* (52:5), *Shu"t Mishnat Rabbi Eliezer* YD (2:1) and sources cited in *Shu"t Yechaveh Da'at* 5:54.

While the added chlorine manages to kill almost all copepods before they reach the faucet, it also helps keep them intact – making them classic examples of *biryot*.⁷⁹ However, as mentioned earlier, some of what appear to be copepods are merely the exoskeletal remains and therefore are not entirely intact. The halachot of *biryah* apply only to entirely intact creatures (YD 100:1) and a *ta'arovet* reverts to the standard regulations of *bitul* when the creature is incomplete (YD 100:1), even if the missing component is not necessary to maintain life (“*eiver she-ein ha-neshamah teluyah bah*”).⁸⁰ This detail is relevant in two respects. First, as previously noted, a small percentage of the white specks in the water are only the molten exoskeletons

79. Another interesting ramification of adding the chlorine is rendering the copepods somewhat destroyed – *nifsedu legamrei*. The *Shulchan Aruch* (YD 84:17) states that a person may eat a “burned *sheretz*” (*saruf*) for medicinal purposes since it is considered like dust. The *Minchat Ya’akov* (46:9) cites several *poskim* as permitting such a person to “burn” a *sheretz* for this purpose and that even a healthy person may eat such a *sheretz* as long as he does not “burn” it for this purpose (cited by *Pri Megadim* (MZ 84:23)). The *Yad Avraham* (YD 84), however, explains that a healthy person may not eat such a *sheretz* because the very act of specifically eating this *sheretz* shows that he does not consider it to be as dust but rather as something desirable (*achsheveih*). R. Raitport argues that the chlorination process is entirely parallel to the “burning” discussed by the *Mechaber* (*Kuntres*, 33). There is clearly no problem of *achsheveih* here since nobody actually desires to eat the copepods and, furthermore, R. Chayim Ozer Grodzinsky claims that *achsheveih* only applies when eating independent *issurim*, i.e. not as part of a *ta'arovet* (*Shu”t Achi’ezer* 3:33). While both burning and chlorination leave part of the *sheretz* intact (not just a pile of ash) it would seem that fire is more thoroughly destructive than chlorine; burning leaves the *sheretz* charred, while chlorination keeps most of their bodies intact. The *poskim* must determine whether the copepods are indeed considered sufficiently “burned” and how that relates to the question of *achsheveih* (as well as possible ramifications for questions of *tum’ah*).

80. *Shach* YD (100:6).

of copepods, not considered *biryot*, and the regular rules of *bitul be-ta'arovet* should apply. Moreover, many of the actual copepods that make it to the faucet are no longer completely intact, missing antennae, legs or other appendages. Second, it relates to the status of cooked copepods. Very preliminary studies have shown that most of the copepods present in agitated (mixed or otherwise disturbed), boiling water are no longer completely intact.

It is important to note that even regarding the intact copepods, *Shu"t Mishkenot Ya'akov* (YD 36) limits the halachot of *biryah* only to creatures that are recognizable as such, but are too difficult to find in their current mixtures ("*omedet be'einah u-bifnei atzmah ve-nikkeret, rak she'eino yadu'a eizeh ha-asurah*") and when they can exist on their own outside the *ta'arovet*.⁸¹ Since the copepods are arguably recognizable only as specks and not as creatures, they should be exempt from *hilchot biryah*.⁸²

81. He proves this from *Beitzah* 3b.

82. There are several other criteria that are required for an *issur* to count as a *biryah*. One is that it must be *assur mi-techilat beriyato*, forbidden from the time of its creation (*Shulchan Aruch* YD (100:1). R. Yonatan Eyebeshutz (*Kereit u-Feleiti* YD (100:4)) argues that creatures that grow from (in) fruits no longer connected to trees should not count as *biryot*, since the creatures only become *assur* when they exit the fruit and as such are not *assur mi-techilat beriyatan*. See R. Shlomo Kluger (*Shu"t Tuv Ta'am va-Da'at* (3:1:160), and *ibid* (2:162). This position is also suggested by *Yeshu'ot Ya'akov* (YD 84:1) and accepted by R. Betzalel ha-Kohen of Vilna, cited by *Mateh Yehonatan* YD 100) who extends this position to apply to creatures that grow from (in) water since they too only become forbidden once they leave their original water source. Many *poskim* however reject this approach. The *Tur ha-Even* (26) argues that *assur mi-techilat beriyato* means to say that nothing physical must take place to make this *issur* into a *biryah*. Since these water creatures are unaffected by their journey into different waters and are then considered to be forbidden, they are within the realm of *assurim mi-tichilat beriyatan*. A similar stringent

VI. Deliberately nullifying an *issur* (*bitul issur*)

approach is offered by the *Chavot Da'at* (100:5) as well as Chida (*Machazik Berachah* 84:10). Both the *Pri Megadim* (*Siftey Da'at* 84:31) and R. Ovadiah Yosef (*Shu"t Yechaveh Da'at* (6:47) in the footnote; R. Yosef has a lengthy discussion there about this issue and cites numerous positions on this issue) claim that none of the *poskim* seriously entertain R. Eyebeschut's approach and it is ultimately rejected in halachic decision-making.

A second criterion cited by many *poskim* is that if an *issur* was created as part of a *ta'arovet*, then it is more amenable to *bitul*. The *Mechaber* (*OC* 320:2) states that although juice that comes out of grapes on Shabbat is forbidden, nonetheless if the juice comes out directly into already prepared (from before Shabbat) juice, the mixture is permitted for use on Shabbat. The *Magen Avraham* (320:5) explains that although the *issur* (juice that came out on Shabbat) is a *davar she-yesh lo matirin* (it will be permitted after Shabbat anyway), since it was never *nikkar* on its own outside of the *ta'arovet*, it is *batel*. The *Mordechai* (*Chullin* 737) takes the diametrically opposed approach; *bitul* can only occur when the *issur* existed independently before becoming mixed in the *ta'arovet* (quoted in *Shulchan Aruch*, *EH* 169:40). R. Raitport (*Kuntres*, p. 23) explains that the *Mordechai's* logic only applies in the very limited case of concomitant creation of both the *issur* and the *heter*. However, when the *heter* existed previously, and the *issur* was created into a *ta'arovet* with that *heter*, the *Mordechai* agrees that *bitul* is possible (see however, *Shach* *YD* (14:12), *Sha'ar ha-Melech*, *Hilchot Yom Tov* (5:20), *Shu"t Avnei Nezer* *YD* 81 and *Shu"t Noda' bi-Yehudah* *YD* (2:54 – 55)).

The *Avnei Nezer* (*YD* 79:1) explains that usage of the leniency of *noldu be-ta'arovet* is limited, however, to cases where the prohibition is one of *davar she-yesh lo matirin*. The applicability of these criteria would depend on the aforementioned disagreement between R. Eyebeschut and the *Pri Megadim* as to the reason that an *issur ha-nikkar* is not *batel*. Even if we are to assume like R. Eyebeschut that it is only because of *davar she-yesh lo matirin*, the *poskim* need to determine whether or not this leniency is valid since the copepods also present a problem of *biryah*. It is unclear whether or not *noldu be-ta'arovet* is sufficient grounds to remove only part of a potential *issur* – meaning that even if we alleviate the problem of *davar she-yesh lo matirin*, we are nonetheless still left with the question of *biryah*.

le-chatchilah

The deliberate negation of an *issur*, *bitul issur le-chatchilah*, in any manner, is prohibited. Regarding already created mixtures (when the *issur* was not deliberately placed in the *ta'arovet*) the *Mechaber* limits *bitul issur le-chatchilah* to Torah prohibitions while the *Ramo* assumes that the accepted practice is to include rabbinic prohibitions as well (YD 99:6). Therefore, if boiling water were to render copepods no longer completely intact, this practice would be permitted by the *Mechaber* and forbidden by *Ramo*. However, the boiling may also render the copepods no longer *nikkar* and, therefore, the permissibility of this action for the *Mechaber* would depend on the aforementioned disagreement of whether *nikkar ha-issur* presents a Torah or rabbinic prohibition.

The *Ran*, however, explains that the prohibition applies only to a person who intentionally negates an *issur* so that he may benefit from that *issur*, when he actively desires that the *issur* add some flavor or substance to this *ta'arovet*.⁸³ If the presence of the *issur* adds nothing to the benefit derived, there is no prohibition of *bitul issur le-chatchilah*. The *Mechaber* (84:13) uses this logic to permit heating honey that has pieces of bees in it so that it may become less viscous and amenable to sifting; the *Tzemach Tzedek* (41) extends this to permit making liquor out of infested fruits for this very reason.⁸⁴ According to the *Tzemach Tzedek*, drinking boiled copepod-infested drinking water should also be permitted, if boiling the water were to entirely eradicate

83. *Avodah Zarah*, 12b (*Hilchot ha-Rif*) s.v. *iba'aya*, also in *Maharam* of Rothenburg (190) and *Shu"t ha-Rashba* (1:467).

84. Cf. *Shu"t Yabi'a Omer* YD (1:6:5, 1:8). Also see *Yalkut Yosef* 9, p. 245 who notes that although the *Kenesset ha-Gedolah* argues that *bitul issur le-chatchilah* applies to objects that are certainly infested (as opposed to those only questionably so), his opinion is rejected by the later *poskim*.

any visual sign of copepod presence in the water (so there would be no question of *nikkar ha-issur*).⁸⁵ Precise studies with adequate controls are necessary, however, to determine precisely what temperature and how much agitation is necessary to render all the copepods no longer intact.

VII. Prevalent minorities (*mi'ut ha-matzui*)

a. Types of mixtures

The halacha defines two types of mixtures, each with its own set of very intricate regulations, using two paradigmatic cases.⁸⁶ Many *poskim* have discussed these issues at great length, especially regarding the applicability and distinction between these cases. The following will merely be a simplistic outline of this intricate, complex issue. The first case is where a piece of meat is found on the street in a locale that has nine kosher butchers and one non-kosher butcher. Since the piece was not found inside any of the stores, we assume that it came from the majority of stores (*holchin achar ha-rov*) and hence is kosher. However, if a person in the same locale bought a piece of meat but cannot remember from which store he bought it, we are stringent and prohibit the meat. Since the uncertainty relates to which store the person entered, which is permanent (the store cannot be found anywhere else), the halacha states that *kol kavu'a ke-mechtzei al mechtzei dami*, loosely translated as, when we are dealing with permanent factors, we ignore the

85. It is important to note that in the *Mechaber's* case, the purpose of the boiling is to remove the bees entirely from the mixture; the only question is regarding the *ta'am* that the bees have exuded into the honey. The *Tzemach Tzedek*, however, goes farther and is even willing to permit the liquor, even though the insects have not been removed. The *Tzemach Tzedek's* case is entirely parallel to our water even if the *Mechaber's* might not be entirely so.

86. *Pesachim* 9b, *Ketubot* 15a, *Chullin* 95a, *Niddah* 18a.

simple majority and assume that the chance of incidence is 50% (thereby prohibiting the meat).

b. *Pirash min ha-rov*

R. Hershel Schachter argues that since only some glasses of water contain copepods, drawing water from the reservoir is parallel to finding a piece of meat outside of the stores, since in both cases there is a certain likelihood that the piece (water) in question is permitted. The question that must be addressed is the status of this cup of water that has been drawn (and hence removed) from the water distribution system. As such we should follow the majority principle and not categorically prohibit the water. Since there are no distinct entities in the reservoir system that are copepod infested and others that are not, the principles of *holchin achar ha-rov* should apply.

From the Torah's perspective, a person must only concern himself with the incidence of *issur* when that frequency exceeds 51%, and at that point we can say *holchin achar ha-rov*. If a certain fruit is bug infested most of the time (more than half), then the Torah prohibits consuming that fruit if it is not first checked and determined to be bugfree. However, if the incidence of *issur* is less than 51%, there is no checking requirement. However, by rabbinic decree, if the incidence of *issur* is less than half but more than a "prevalent minority" (*mi'ut ha-matzui*), one must check that produce before consumption.⁸⁷ For example, although there are various pathologies that render an animal a *tereifah*, we do not check each slaughtered animal for all of these signs, since their frequency is less than the required threshold (less than a *mi'ut ha-matzui*). Pathologies of the lung, however (*sirchot ha-rei'ah*), are determined to constitute a *mi'ut ha-matzui* and as such must be checked by rabbinic decree.⁸⁸

87. *Pri Megadim YD, Sifte Da'at* (84:28).

The same regulations apply to checking produce (and water) for insect infestation.

c. Determining *mi'ut ha-matzui*

The precise frequency that determines prevalence (*metzi'ut*) is a matter of dispute among *poskim*. The Rivash (*Shu"t Rivash* 191) posits that the necessary frequency is close to one half (*karov le-mechetzeh*) as well as being a normal occurrence (*ragil li-hiyot*). This is only slightly less than the 51% frequency that the Torah requires for checking. The *Mishkenot Ya'akov* (YD 17) goes to great lengths to prove that *mi'ut ha-matzui* is defined as a 10% occurrence, and R. Shlomo Zalman Auerbach is oft quoted as endorsing this opinion.⁸⁹ R. Schachter frequently cites R. Yosef Dov Soloveitchik's opinion that *mi'ut ha-matzui* should be approximately 14.5%.⁹⁰ R. Shemuel Wozner adopts a more subjective approach.⁹¹ Rather than the halachic definition of *mi'ut ha-matzui* being dependent upon specific percentages, the halacha looks to whether the prevalence of the incidence of the *mi'ut* in question is "rather prevalent" (*matzui harbeh*). He vaguely defines this requirement that if in a random sampling of mixtures, most mixtures will have the *mi'ut* accompany the *rov*, it is considered *matzui*.⁹² R. Yosef Shalom Elyashiv is also

88. *Torat ha-Bayit ha-Aroch* (3:2) [33b in the Warsaw edition], *Shach* YD (39:8), more forcefully in *Aroch mi-Shach* YD (39) and *Gr"a* YD (1:4).

89. *Bedikat ha-Mazon ka-Halacha*, p. 181. Also see *Shu"t Beit Ephrayim* YD 6 on the issue of a *safek issur*.

90. Based on what he determined was the actual incidence of *sirchot* in cow lungs in his time.

91. *Shu"t Shevet ha-Levi* YD (4:81).

92. It seems that he is trying to say that in five groups of one hundred items each, each group has at least 10 instances of the *mi'ut* and not that four groups have 15 each and the fifth has none at all (even though in the larger picture the latter scenario has a higher

quoted as defining *matzui* as less than 10%.⁹³

The most important element of this equation is to determine the functional unit of these calculations; we must determine the sample size before calculating frequencies. R. Hershel Schachter has argued that the unit should be defined by the normal amount of water drunk at a meal by a single person, assumed to be approximately 16 ounces. Therefore, according to the *Mishkenot Ya'akov*, if copepods are found in one out of every 10 glasses of water (1 copepod in 160 ounces), checking is required before drinking. Other *poskim* have defined other units to be used for this purpose and the conclusions should be drawn appropriately.

d. Reality

Testing conducted for the Orthodox Union, as well as DEP testing in response to consumer complaints, revealed varying concentrations. The DEP checked various complainants' homes as well as various water mains throughout the five boroughs of New York City. They claim "the number of Cyclops [*D. thomasi*] in the samples varied from 0 to 22 per liter, with an average value of 9 per liter. The number of copepods present in these samples varied for each borough. Although the Brooklyn samples contained the largest number of copepods, no conclusion can be drawn about the distribution of copepods through the city because of the small sample size and the bias in sampling locations."

As of now it seems that no conclusion can be drawn about the absolute concentration of copepods at the faucet. It is clear, however, that studies of copepod populations and their seasonal cycling in the reservoirs has little to do with their presence in

percentage of *issur* in the entire sample).

93. *Bedikat ha-Mazon ka-Halacha*, *ibid.*

tap water. First, the independent studies performed by and for the Orthodox Union were scientifically imprecise, with no proper protocol for obtaining, analyzing or quantifying the finds. Second, the DEP analysis used 500uM mesh filters to obtain their samples; the human eye can distinguish between objects much smaller than that and copepods smaller than 500 uM are also halachically meaningful. Last, it must be understood that various communities will have various degrees of infestation. Testing conducted at several homes within one block of each other displayed highly varied results. Even at faucets where copepods were present at specific times, none could be found two months later. Different water currents at various points in the system, as well as having no dead ends between terminal branches of the system, vary the flow of water throughout the distribution. It is furthermore unclear how the changing weather affects this distribution. One of the largest water holding tanks in the world is under Staten Island, greatly altering the distribution of copepods within those waters. Pipes to different parts of the Island stem from different areas of this tank and the copepod distribution at all parts of the tank is not equal. Parts of Queens receive some components of their water from natural springs found within the borough, further altering the distribution. Lastly, it is important to note that nothing can be concluded regarding the seasonal variability of the incidents of copepods in tap water since people have only begun to look for them since June 2004. It will take several years of extensive testing in very many areas of the city to be able to precisely analyze the frequency of incidence of copepods in the tap water throughout the year. For all of these reasons, the frequency of copepod infestation at the tap is highly variable. In certain places it definitely reaches beyond the threshold of *mi'ut ha-matzui* (perhaps even as defined by the Rivash) while in others the incidence is almost nonexistent.

e. Possible halachic considerations

It may be the case that the rabbinic decree of requiring checking for an *issur* occurring at as small an incidence as *mi'ut ha-matzui* applies only to Torah prohibitions. With regard to uncertainty in Torah prohibitions, even when there is less than a 50% frequency (*safek de-oraita*), the rule is that we are stringent. Therefore the rabbis instituted checking for a *mi'ut ha-matzui* as well. However, since uncertainty in rabbinic prohibition, *sfeika derabbanan*, is ruled leniently, perhaps there is no requirement to check even for a *mi'ut ha-matzui*. The various proofs brought by all the *poskim* (except for one⁹⁴) to prove the precise frequency of *mi'ut ha-matzui* all deal with Torah prohibitions. If we are to assume that the copepods present only a rabbinic prohibition, either because they are *batel* on a Torah level (because they are not identifiable) or for any of the aforementioned reasons, there is nonetheless no reason to obligate checking.

VIII. Filtration

Should the *poskim* conclude that drinking copepod-infest water is indeed forbidden, filtering the water is a rather straightforward method of avoiding this problem. There are various models and varieties that can remove various substances from the water. The simplest type, a particle filter, is sufficient to alleviate the copepod concern, while other filtering elements such as activated carbon are added for aesthetic reasons. Some filter all water entering the home, some under the sink, and some on the faucet. Care must be taken when choosing a specific model in that not all models can filter hot water. The most important criteria of filters for these purposes is the pore size of the filter itself, measured in microns (uM). While many filters

94. The one case that deals with a rabbinic prohibition is checking for *chametz*, *bedikat chametz* in *Pesachim* 4b. (See *Maggid Mishnah*, *Hilchot Chametz u-Matzah* 2:12 and *Gra* (YD 1:4).

advertise a specific pore size, closer examination reveals that this is more often than not a claim of nominal pore size, not absolute pore size. This means that a 50uM filter will catch most, **but not all** 50uM objects. However, as object size increases, so does the filtration rate of these units. Since the average person cannot distinguish objects smaller than 50uM, a filter with such a pore size should suffice, as the vast majority of the copepods found at the tap are adults of much larger dimensions.

The permissibility of filtration on Shabbat is very complex, as it relates to the prohibitions of *borer* and *meraked* and is beyond the scope of this paper, but a rabbi should be consulted by people who install filtration systems on their water supply.

IX. Conclusions

The issue of copepods is an issue that touches the very practical core of many people's lives and is of tremendous importance. Water is a basic necessity and must be respected as such. This is not only a question about single faucets, but also how people will relate to neighbors and friends who do not filter their water. It will reflect kashrut policies in restaurants as well as food production factories. It will also have a heavy impact during the hot summers, especially on the very young and the very old whose hydration needs increase dramatically with the outside temperature. It will also impact on hospitals and old age homes, where patients and residents may not have as much say in the food they eat. This is one of the more profound and influential *piskei halacha* of our time. Hopefully this article has served as a background to understanding some of these complex ideas.

Machine-Baked *Shmurah* Matzoh for the Seder

Rabbi Israel Botnick

Introduction

The introduction of automated machinery in the process of baking matzoh has raised a number of questions regarding the kashrut of these matzot for Pesach, and regarding their use for the mitzvah of eating matzoh on Pesach at the Seder.

Until the 19th century, the matzoh baking process had remained essentially the same, kneading the dough, rolling the dough, and all other activities up to the point where the dough is put in the oven were all done by hand. This changed in 1838 in France, when a machine was invented which assisted in the baking process. These and similar machines were first used in France and Western Europe, and eventually spread to Eastern Europe, Israel, and America.¹

The first machines were useful only for limited parts of the baking process and were operated manually, requiring

1. *Hachashmal Behalacha*, pp. 84 and 102; *Otzar Yisrael*, "Matzoh". Matzot began to be baked by machine in Jerusalem in 1863. Matzot were not baked by machine in America until close to the end of the 19th century. Rabbi Dov Ber Manischewitz came to America in the mid 1880's and opened a matzoh bakery in Cincinnati in 1888. Aron Streit opened the Streit's Matzoh Bakery on the Lower East Side in 1916.