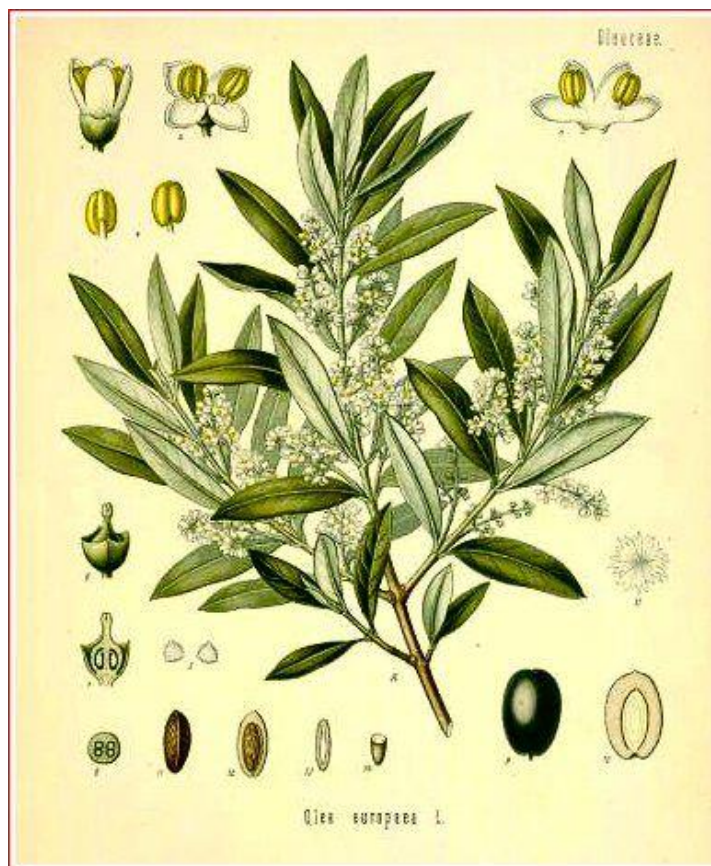


The **EVOLUTION** *of the* **OLIVE**

The Halachic History of the Expanding Kezayis



Rabbi Natan Slifkin

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Introduction

R. Moshe Sofer (Chasam Sofer, 1762-1839) notes that today, when there is no Temple, there is only one Biblically-ordained mitzvah involving eating: that of eating matzah on the first night of Pesach.¹ Accordingly, he stresses that one must be careful to be punctilious in the fulfillment of this mitzvah. Aside from the mitzvah requiring a certain type of food, there is also a requirement of a sufficient minimum quantity to qualify as “eating.” This quantity is defined in the Midrash:

There is no “eating” with less than a *kezayis* (equivalent to an olive). (*Toras Kohanim, Acharei* 12:2; *Emor* 4:16)

How much is this quantity? R. Chaim of Volozhin (1749-1821) is widely revered as the father of the yeshivah world. Less known and certainly less popular in the yeshivah world is his view as to the size of the matzah that one is obligated to eat on Pesach. R. Chaim was of the view that this *kezayis* is actually the size of an olive—around three or four cubic centimeters.² This results in a piece of matzah about half the size of a credit card.

Yet this is in sharp contrast to common custom today. The widespread policy is to quantify a *kezayis* as 28.8 cubic centimeters. The *Mishnah Berurah* states that one should eat a volume equal to an egg, which is about 55cc. And there are boxes of machine matzot which state on the packaging that one whole matzah equals a *kezayis*! The greatest irony is that, in the effort to perform the mitzvah as scrupulously as possible, some might engage in *achilah gasah* (gorging oneself), which surely could not be the intent of the mitzvah and which might prevent a person from fulfilling his obligation.

Recently, there have been efforts by some individuals to prove that the *kezayis* should be scaled down, but they have met with little success and much opposition. In this study, while proving that the *kezayis* is the size of a regular olive, the focus will be on exploring how it happened that so many authorities ruled it to be far bigger, and why it is difficult to overcome this view.

¹ Responsa Chasam Sofer, *Choshen Mishpat* 196.

² R. Yisrael Yaakov Kanievsky, *Kehillas Yaakov, Pesachim* 38. See too A. Z. Katzenallenbogen, *Shaarei Rachamim* (Vilna 1871) p. 19, #165 note 3.

Logically, in order to reach the conclusion that a *kezayis* is much larger than olives are today, two separate positions must both be taken: First, that olives of ancient times were much larger, and second, that we are obligated to follow the size of ancient olives rather than the olives of today. Neither one of these positions on their own is sufficient to require a larger measurement; they must both be adopted. Let us begin by evaluating both of these positions in turn.

Were Olives Bigger in Ancient Times?

Were olives of the Biblical or Talmudic era larger than those of today? From the standpoint of archeology, there is clear evidence the olives of ancient times were *not* any bigger than those of today. Many olive pits from ancient times have been discovered, including a huge number in the remains of the settlement at Masada and in caves in the Judean Desert dating from the Bar-Kochba revolt. These pits were mostly from the Nabali strain of olives, but also included the local Suri and Melisi varieties, as well as the large Shami and Tohaffi olives that were imported as luxuries from other countries. All these pits are not significantly different in size from the pits of those olive strains today.³ One could claim that the flesh-to-pit ratio used to be greater, but this is unlikely, and should not be accepted without good reason.⁴

Furthermore, there are dozens of olive trees alive today of the Suri variety, in Israel and elsewhere, which are around two thousand years old, and seven in Israel that are over three thousand years old. These trees even still produce fruit, which are no different in size from the fruit produced by young olive trees.⁵ One could claim that they used to produce larger fruit, but this is exceedingly unlikely from a botanical perspective.

All the empirical evidence, then, indicates that in Talmudic and even Biblical times, olives were no larger than those found today. The Mishnah specifies which of the various strains is intended when the olive is given as a halachic measurement:

The *kezayis* of which they spoke is neither a large one nor a small one, but rather a medium-sized one, which is the *egori*. (Mishnah *Keilim* 17:8)

³ Mordechai Kislev, “*Kezayis* – The Fruit of the Olive as a Measure of Volume” (Hebrew), *Techumin* 10 pp. 427-437; “Everything is According to the Opinion of the Observer – A New Evaluation of the Measurement of a *Kezayis*,” (Hebrew) *BDD* vol. 16 pp. 77-90.

⁴ The Talmud (*Sotah* 48a) does state that since the destruction of the Temple, the *shuman* of olives was reduced. However, this is never brought up by any Rishon in their halachic discussions; perhaps it refers to the nutritional benefit rather than the size of the flesh,

⁵ M. Kislev, Y. Tabak & O. Simhoni, *Identifying the Names of Fruits in Ancient Rabbinic Literature*, (Hebrew) *Leshonenu*, vol. 69, p.279.

The large olive mentioned in the Mishnah would correlate with the Shami, which measures around 12-13cc, and the small olive would correlate with the Melisi, which measures around 0.5-1cc. The medium-sized olive would be the prevalent Suri and/or the slightly larger Nabali strains. The Suri ranges from 2.5-3.5cc, while the Nabali ranges from 4-6cc.⁶ The *kezayis* of the Talmud, which would be the same as the *kezayis* of today, would range from 2.5-6cc with an average of around 4cc.

The Geonim: Following the Observer

Already, then, we see that there appears to be no reason to ever assume that an olive was any larger than olives today. But what if, for whatever reason, someone were to believe that perhaps olives of ancient times were larger—would they be obligated to replicate that quantity? The Geonim rule that this is not the case. Around 130 years ago, three responsa on this topic from the Geonic period were discovered. The first is from Rav Sherira Gaon (Babylonia, c.900-c.1000):

You asked me to explain if there is a weight given for the fig, olive, date and other measurements, in the weight of Arabic coins, and you explained that Rav Hilai Gaon clarified that the weight of an egg is 16 $\frac{2}{3}$ silver pieces. [You wondered,] if the others do not have an ascribed weight, why is the egg given one?

It is known that these other measurements are not given any equivalent weight in silver, not in the Mishnah nor the Talmud. If [the Sages] had wished to give a measurement in terms of the weight in *dinarim*, they would have done so originally. Rather, they give the measurements in terms of grains and fruit, which are always available, and one is not to say that they have changed.

...We practice according to the Mishnah: Everything goes according to the observer... And likewise with regard to the olive and date, it is explained in this Mishnah that it is not referring to a large one, or a small one, but rather an average one—and it is also according to the view of the observer. The reason why some rabbis gave their view as the size of an egg, and did not do the same with an olive, date or fig, is that there are many things that are dependent upon the size of an egg—the *kab*, the *sa'ah*, the *efoh*, the *omer*; all are evaluated in terms of eggs, and therefore they estimated it according to their views, but these other measurements are left to the opinion of the observer... (Cited in *Sefer Ha-Eshkol* vol. II, *Hilchos Challah* 13 p. 52)

The intent may be that since the *kab*, *sa'ah* etc. are multiples of eggs (a *kab* is 24 eggs, a *sa'ah* is 144 eggs), it is difficult to visualize this in terms of eggs, and it is easier to visualize it in terms of silver.⁷ However, with measurements given as a *kezayis*, there is no reason or basis for giving an alternate measurement.

⁶ Kislev, *ibid.*

⁷ R. Chaim Beinish, *Midot VeShiurei Torah*, pp. 522-523.

Rav Sherira Gaon's son, Rav Hai Gaon (Babylonia 939-1038), writes as follows:

...And therefore the Torah gave measurements in terms of eggs and fruits—for *divrei sofrim* were given at Sinai...—because eggs and fruit are found in every place. For it is known and revealed before the One Who spoke and brought the universe into existence, that Israel is destined to be scattered amongst the nations, and that the weights and measures that were in the days of Moses and that which were added to in the Land of Israel would not be preserved, and that the measurements change in different times and places... Therefore the Sages related the quantities to fruit and eggs, which always exist and never change. They made the quantity of an egg depend upon the view of the observer. (Ibid. pp. 56-57)

A final responsum, from an unknown Geonic author, states:

And that which you wrote regarding the size of a large fig and a medium fig, and likewise a large olive and a small and medium olive—surely these are *shiurim*, and how can there be a *shiur* for a *shiur*? And should you say that it is [a matter of ascribing] a weight—our rabbis did not specify a weight, and the Holy One was not particular with us regarding the weight. Every person, in acting according to his own assessment, has fulfilled his obligation, and there is no need to learn the quantity from another... (*Teshuvos HaGeonim* 268, Harkavey ed.)

In all these responsa, we see that the *kezayis* is intended to be assessed, very simply, by each person looking at an olive. Even if one were to believe that the olives of the Talmudic era were larger than those of today, there would be no need to attempt to replicate that quantity.⁸ With the Geonim, we see a presumption that the size of olives does not change, and that in any case each person is supposed to follow his own assessment of an olive.⁹ This was seen to be the

⁸ There is a statement in the Talmud which might seem to show that we are supposed to replicate the measurements of the Talmud rather than to use the measurements of our own era: “Rabbi Elazar said: One who eats *chelev* nowadays must record for himself the quantity, in case a future Beis Din will increase the measurements (for which one is liable)” (Talmud, *Yoma* 80a). A similar ruling is found in the Yerushalmi: “Rabbi Hoshea said: One who eats a forbidden food in our day must record the quantity, in case a later Beis Din will arise and change the quantity (for which one is liable), and he will know how much he ate” (Yerushalmi, *Pe’ah* 2a). This sounds like there is an absolute measurement of a *kezayis*, valid for all times and places. Each Beis Din does its best to assess what this measurement is, but because it is possible that they are mistaken, one must record the amount eaten in case a future Beis Din assesses matters more correctly. Accordingly, it seems that the objective is to figure out the quantity used in the Talmud, not to follow the size of olives in one’s own era! However, further analysis shows that this could not be the intent of the Talmud. How is the person going to be recording the amount that he ate? There was no possibility of a person recording it in terms of cubic centimeters or some other such absolute unchanging standard; and if such a standard had existed, surely the Sages would have used it for their measurements! Instead, the intent of the Talmud is that he is recording whether, for example, he ate the volume of a big olive, a medium olive, or a small olive. The concern is not that the size of olives will change, but rather that the quantity for which one is liable will change – is one liable for a big olive, a medium olive or a small olive. See *Sdei Chemed, Ma’areches HaAlef*, 34, s.v. *velashon*.

⁹ These response are also cited by R. Eliezer Waldenberg in *Tzitz Eliezer* vol 13, 76:3.

underlying rationale of the Torah prescribing quantities in terms of familiar fruit rather than by some independent system of measurement.

The Rishonim of Sefarad

Let us now turn to the era of the Rishonim, and we shall begin with the Rishonim of Spain and comparable regions. Rambam (Spain/Egypt 1135-1204) makes no statement regarding the size of a *kezayis*. But an inference regarding its maximum size can be drawn from his statement that a dried fig is $\frac{1}{3}$ of an egg.¹⁰ Since the Talmud notes that a *kezayis* is smaller than a dried fig,¹¹ this would result in a *kezayis* being less than $\frac{1}{3}$ of an egg.¹²

It is important to note that our inference of Rambam's view regarding olives does not tell us anything as to the absolute size of a *kezayis*, only that it must be less than $\frac{1}{3}$ of an egg (which is, of course, true of a regular olive). However, this inference was later apparently later interpreted to mean that Rambam was of the view that a *kezayis* is actually *equal to slightly less than* $\frac{1}{3}$ of an egg, and then to mean that he was of the view that a *kezayis* is *equal to about* $\frac{1}{3}$ of an egg.¹³ One

¹⁰ *Mishneh Torah, Hilchos Eruvin* 1:9.

¹¹ Talmud, *Shabbos* 91a.

¹² There is a potential difficulty with this inference, in reconciling it with an inference from two statements in the Talmud. As we shall see later, the Talmud in one place states that a person can swallow food up to the size of two olives, while elsewhere it states that a person can swallow food up to the size of an egg. These passages indicate that an olive is half the size of an egg. How can this be reconciled with our inference that Rambam's position is that an olive is less than $\frac{1}{3}$ of an egg? The Vilna Gaon (1720-1797) claims that the inference in the Talmud that an olive is half the size of an egg is referring to a person swallowing an egg without its shell, but an egg with its shell is three times the size of an olive (*Biyur HaGra to Orach Chaim* 486:1). This does not necessarily mean that a shell changes an egg from being twice the size of an olive to being more than three times its size (which is clearly not the case!). Rather, the point is that a hard-boiled egg without the shell is sufficiently pliable that a person can swallow a whole one, just as a person can swallow two olives. But the olive is less than a third the size of an egg with its shell. R. Chizkiya ben David DiSilva (1659-1698, author of *Pri Chadash*) writes that the Talmud's statement that the throat cannot hold more than two olives is imprecisely written, and actually refers to an olive and a date (*Pri Chadash, Orach Chaim* 486:1). R. Yaakov Orenstein (author of *Yeshuas Yaakov*) states that Rambam simply considers the Talmud's statement to be disputed by the other statement about the throat being able to hold an egg, and Rambam does not follow that view (*Yeshuas Yaakov, Orach Chaim* 301). According to both these approaches, Rambam is indeed of the view that a *kezayis* is less than $\frac{1}{3}$ of an egg. R. Avraham Gombiner (c.1633-c.1683, author of *Magen Avraham*) suggests that according to Rambam, when the Talmud rated an olive as being smaller than a dried fig, it was only referring to a small olive, but an average olive is larger than a dried fig. It seems that R. Gombiner interpreted Rambam's view as being that an average olive is equal to half an egg. However, it does not seem that anyone else adopted this understanding of Rambam.

¹³ See *Mishnah Berurah* 486:1 and R. Pinchas Bodner, *The Halachos of K'zayis* p. 25 note 27. R. Yaakov Yisrael Kanievsky, in *Shiurin Shel Torah* 11 p. 70 notes that Rambam should not be misinterpreted in this regard.

can propose how this happened; since it was not known how much less than $1/3$ of an egg it was,¹⁴ nor is it convenient to quantify “less than $1/3$ of an egg,” the upper limit was taken as the bottom line and simplified to $1/3$ of an egg. The problem with this result is that when the process itself is forgotten, it is assumed that Rambam’s position *opposes* the idea that a *kezayis* is much smaller than $1/3$ of an egg,¹⁵ whereas the truth is that he does not oppose it at all.

Furthermore, from the fact that Rambam does not specify the size of a *kezayis* – whereas he does specify the size of other quantities¹⁶ – one can presumably infer that his position was that a *kezayis* is the size of an ordinary olive, and/or that it is up to each person to assess it on their own, rather than to attempt to calculate the size of a Talmudic olive.¹⁷

For a long time, it was thought that Rambam is the only authority from Sepharad whose view regarding the size of an olive can be assessed. Recently, however, two more sources came to light. Rashba (R. Shlomo ben Aderes, Spain, 1235-1310), in discussing a different topic, mentions that fifteen eggs are “much” more than sixty olives; hence, an olive is *much* less than $1/4$ the size of an egg.¹⁸ Ritva (R. Yom Tov ben Avraham Asevilli, Spain, 1250-1330), in a newly published manuscript, states that a dried fig is the volume of “several” olives.¹⁹ Since he is also of the view that a dried fig is $1/3$ the size of an egg, this means that an olive is around $1/9$ the size of an egg.

It is important to note that none of these authorities set out to specify the size of an olive, or grappled with statements concerning its size (as we shall see to have been the case with the Rishonim of Ashkenaz). Our knowledge of their position regarding the size of an olive, or the upper limit of the size of an olive, is inferred from statements of theirs made in a different context. The clear implication is that they took it for granted that a *kezayis* is the size of an ordinary olive.

By the same token, the fact that most authorities of this period did not make any statement relating to the size of an olive does not mean that we have no idea as to

¹⁴ R. Yosef Kotkovski argues that an olive must be significantly smaller than a dried fig; see *Darkei HaChaim* (Petrikow 1884), *Hilchos Borei Minei Mezonos* 4, *Chelki b’Chaim* 3. However, R. Chaim Na’eh, *Shiruin Shel Torah* p. 190 n. 24 disagrees.

¹⁵ See Rabbi Moshe Petrover, “The Size of the *Kezayis* for Eating Matzah: A Clarification of the View of the Chazon Ish” (Hebrew), *Moriah* 5754, p. 106.

¹⁶ Commentary to the Mishnah, *Eduyos* 1:2, *Keilim* 2:2; *Mishneh Torah*, *Eruvin* 1:12.

¹⁷ R. Hadar Margolin, “A Clarification of the View of the Chazon Ish,” (Hebrew) *Moriah* 3-4 (5753) p. 100.

¹⁸ Rashba, *Mishmeres HaBayis* 4:1.

¹⁹ Ritva to *Shabbos* 76b; printed at the back of the Mossad HaRav Kook edition.

what their view was. For someone for whom a *kezayis* is obviously an olive, there is no need to make any comment about it. One can assume that the reason why they did not comment on the size of a *kezayis* is that it was obvious to them that a *kezayis* is *kezayis*.

The Rishonim of Ashkenaz

It is in Ashkenaz that we find the olive beginning to evolve with the statements of the Rishonim themselves (as opposed to with later mistaken inferences regarding the Rishonim). The Rishonim of Ashkenaz translated the size of an olive into a proportion of an egg, but they gave different quantities. This was based on differing resolutions of various passages in the Talmud. In one place, the Talmud states that a person can swallow food up to the size of two olives:

The Sages evaluated that the throat cannot hold more than two olives. (Talmud, *Krisus* 14a)

Elsewhere, the Talmud states that a person can swallow food up to the size of an egg:

The Sages evaluated that the throat cannot hold more than a chicken's egg. (Talmud, *Yoma* 80a)

These passages indicate that an olive is half the size of an egg. However, in a third place, a different conclusion emerges. The Talmud (*Eruvin* 82b) discusses the amount of food required for an *eruv*. Two of the views cited express their opinion in terms of *kabin*, which in turn can be expressed in quantities of eggs (since 1 *kav* is 24 eggs):

- Rabbi Shimon: Two meals are $\frac{2}{9}$ of a *kav*, which is $5 \frac{1}{3}$ eggs.
- Rabbi Yochanan ben Beruka: Two meals are $\frac{1}{4}$ of a *kav*, which is 6 eggs.

Elsewhere, the Talmud states that two meals are equal to 18 dried figs.²⁰ Now, as we saw earlier, an olive is known to be smaller than a dried fig.²¹ This results in the following calculation:

- Rabbi Shimon: Two meals = $5 \frac{1}{3}$ eggs = 18 dried figs; thus 1 olive is less than $\frac{3}{10}$ of an egg
- Rabbi Yochanan ben Beruka: Two meals = 6 eggs = 18 dried figs; thus 1 olive is less than $\frac{1}{3}$ of an egg

How are all these sources to be reconciled?

²⁰ Talmud, *Eruvin* 80b.

²¹ Talmud, *Shabbos* 91a.

Ri (R. Yitzchak ben Shmuel the Elder of Dampierre, 12th century) concludes from the passages concerning swallowing that an olive is half the size of an egg.²² As for the passage in *Eruvin*, he states that we do not follow the views of either Rabbi Shimon or Rabbi Yochanan ben Beruka; thus that discussion has no inferences for the size of an olive. Ri's view that an olive is half the size of an egg was adopted by R. Mordechai b. Hillel (Germany, 1240-1298),²³ R. Alexander Zusslein HaKohen (France/Germany, d. 1348)²⁴ and R. Yaakov Weil (Germany, 15th century).²⁵

Rabbeinu Tam (Yaakov ben Meir Tam, France, c. 1100–c. 1171), on the other hand, states that we rule in accordance with Rabbi Shimon, an olive must be less than 3/10 of an egg (although he does not propose how much less). Regarding the statements concerning swallowing which indicate that an olive is half the size of an egg, Rabbeinu Tam suggests that the foods are in different states, which affects the volume that can be swallowed. An egg is much easier to swallow than an equivalent volume of olives. Because olives are hard and contain pits, only two can be swallowed at a time, even though they are much smaller than a single whole egg, which can be swallowed in one gulp.

In a variant of this approach, *Tosafos Yeshanim* reconciles it by suggesting that they are descriptions of different types of swallowing. When the Talmud spoke of a person being able to swallow two olives, it was referring to what a person can swallow in the course of ordinary eating. However, when it spoke of a person being able to swallow a whole egg, it was referring to the maximum that a person can force themselves to swallow.

Rabbeinu Tam's approach does not draw any conclusions as to the absolute size of an olive, only that it must be less than 3/10 of an egg (which is, of course, true). However, this view was later apparently interpreted to mean that it *equals* slightly less than 3/10 of an egg. (The ratio of 3/10 was later slightly expanded to 1/3, for reasons that are unclear; perhaps as it is a simpler quantity to assess.)

Reasons for the Ashkenazi Expansion

Why did the Ashkenazi authorities relate the size of an olive to the size of an egg, especially since, according to Ri, this results in the error of considering an

²² *Tosafos* to *Yoma* 80a s.v. *Veshiaru*. (The same inference is apparently made by *Sefer HaChinnuch*, mitzvah 313.) R. Chaim Na'eh argues that Ri must mean that an olive is slightly less than half the size of an egg; see *Shiurei Torah*, p. 192.

²³ Mordechai, End of *Pesachim*, *Seder Leil Pesach*.

²⁴ *Sefer Ha-Agudah*, *Eruvin* 82b.

²⁵ Mahari Weil 193.

olive to be half the size of an egg? Why did they not follow the position of the Sephardic authorities, that a *kezayis* is the size of an olive?

The simple answer is given by Rabbi Akiva Yosef Schlesinger (1835-1922). He writes:

The measurement of an egg is not found in the Torah; rather, it says, “a land of... olives” etc., that all its measurements are like olives, and this olive was only rated by the measurement of an egg for those who did not have olives. But not for us, who see the olive in front of us—there is no need to push aside the *ikkar* for the *tafel*. (*Tel Talpios*, Shevat 5661 p. 103)

The medieval Ashkenazic authorities never saw an olive. Olives do not grow that far north; they only grow in the Mediterranean region. In medieval Europe, transporting commodities was expensive, and was only done with foodstuffs for which there was high demand. Many food items were simply unknown in some regions. In an early 15th century Bavarian translation of an Arabic pharmacopoeia, the German translator has to explain to his readers what various foodstuffs (such as sesame seeds and pistachio nuts) actually are.²⁶ In northern Europe, unlike with the Mediterranean region, olives were not part of the menu and they were virtually unheard of.²⁷ Only olive oil was imported, and even that was very expensive and only used by the wealthy. In the oldest German cookbook entered in a parchment codex in Wuerzburg around 1350, no olives are mentioned, and oil (which may not even be olive oil) appears only once.²⁸

Thus, the Rishonim of Ashkenaz were simply unfamiliar with olives. They could only attempt to calculate the olive’s size based on deductions from various statements in the Talmud. As a consequence, they greatly increased the size of a *kezayis*.²⁹

²⁶ Prof. Melitta Weiss Adamson of the University of Western Ontario, personal communication.

²⁷ Melitta Weiss Adamson, *Food in Medieval Times*, pp. 29-30; John Ayto, *The Glutton’s Glossary: A Dictionary of Food and Drink Terms*, p. 198.

²⁸ Melitta Weiss Adamson, personal communication.

²⁹ It is also possible that even if the Rishonim of Ashkenaz would have had access to olives, they would still have ignored empirical investigation in favor of Talmudic analysis. R. Menachem Meiri (Catalonia/ Provence 1249 – c. 1310) also calculates that an olive is half the size of an egg, based solely on an internal analysis of the Talmud, even though olives did exist in his region (*Beis HaBechirah* to *Eiruv* 80b). In medieval Europe, empirical investigation was not valued as highly as it is today. Furthermore, as we shall soon discuss, Ri and Rabbeinu Tam did not deliberate over the size of a *kezayis* in the context of issuing a practical ruling, but rather as part of an attempt to resolve a conflict in the Talmud.

R. Eliezer b. Yoel HaLevi (Germany, c.1140-c.1225) explicitly acknowledges that his community in Ashkenaz knew that they were missing direct observation, and that they therefore decided to err on the side of caution:

And wherever a *kezayis* is required, the food should be measured generously, since we are not familiar with the measurement of an olive, and so that the blessing should not be in vain. (Ravyah, *Berachos* 107)

Another revealing statement comes from one of the Rishonim from the generation of the Rosh. He was addressing a question that arises from Hillel having eaten a *kezayis* each of matzah, *maror* and *charoses* simultaneously, which was problematic for those who believed that two olives was the maximum that the throat can hold. This rabbi pointed out that based on what he had seen on his travels to Israel, there is no difficulty in this:

To me there is no difficulty, for I saw olives in Israel and Jerusalem, and even six were not as large as an egg. (*Piskei Rabboseinu SheBeAshkenaz, Moriah*2:3)

We thus see that the Rishonim of Ashkenaz themselves acknowledged that, living in Ashkenaz, they had not seen olives. Note that no Rishon claimed to have measured the olive and seen that it is equal to half or third of an egg. They all used indirect textual arguments to try to determine the size of the olive. The aforementioned Rishon is the only Rishon who describes using observation, and he says that an olive is less than a sixth of an egg.

This in turn answers the following question. Even given the view of Ri that the Talmud dictates that an olive is half the size of an egg, why assume that this means that olives back then were larger? Why not explain instead that eggs back then were smaller? This question is especially potent since the fundamental measurement for the mitzvos of eating is in terms of olives, not in term of eggs.³⁰ So why pick a different unit of measurement as the barometer?

The answer is that for Ri, and many others after him, there was no first-hand experience with olives. On the other hand, they were familiar with eggs. Since the olive was the food whose size they didn't know and were trying to determine, it was natural to assume that the egg of the Talmud was the same as their egg, and the olive was half that size. There was no reason to assume otherwise. Today, however, when we know that olives are not and were not that big, and we also know that eggs were formerly smaller (as we shall later discuss), there is no reason why, even if we are reconciling the Talmudic statements about olives and eggs, this should lead us to the conclusion that olives must have been bigger.

³⁰ See Moshe Koppel, "The Sages Evaluated" (Hebrew), *Higayon* 5 pp. 55-62 for a valuable discussion of the concept of primary and secondary units of measurement.

There is a further point to consider in evaluating the adoption of the view of the Rishonim of Ashkenaz. Ri and Rabbeinu Tam did not deliberate over the size of a *kezayis* in the context of issuing a practical ruling, but rather as part of an attempt to resolve a conflict in the Talmud. It is far from clear that they were of the view that for one's own obligation, one always needs to replicate the size of a Talmudic olive. They may well have adopted the view of the Geonim, that if one has access to olives, one should follow the size of an olive in one's own time and place. Perhaps initially the rulings of the Ashkenazi Rishonim were adopted because nobody had anything better to go with. And even later when people did have alternatives, the statements of these authorities had already been accepted as formal rulings regarding what size a *kezayis* should be.

The Shulchan Aruch's Ambiguous Ruling

In the *Shulchan Aruch* of R. Yosef Karo (Spain/Israel, 1488-1575), the chapter concerning the size of a *kezayis* contains only one section, and it is probably the shortest chapter in the entire work. Its wording is intriguing:

The amount of a *kezayis*—some say that it is around half of an egg. (*Shulchan Aruch, Orach Chaim* 486:1)

This ruling is surprising in that R. Karo does not rule what a *kezayis* is; he just notes what “some say” it is. This is widely understood to mean that he is citing this view as a stringency, but that he himself is of the view that it is smaller.³¹ But how much smaller? An inference can be drawn from a ruling elsewhere,³² where in discussing the quantity of two meals for an *eruv*, he follows the ruling of Rabbi Yochanan ben Beruka in quantifying this as being the size of six eggs, and equates this with 18 dried figs. The inference is that a *kezayis*, which is smaller than a dried fig, must be less than 1/3 of an egg.

Many therefore state that while the *Shulchan Aruch* records the stringent view of a *kezayis* being 1/2 an egg, it rules a *kezayis* to be slightly less than 1/3 of an egg. However, a careful analysis shows that this is not the case. All we can derive from the discussion regarding *eruv* is that the *maximum* size must be somewhat less than 1/3 of an egg; we still have no inference as to how *much* less it is. In theory it is still entirely possible that the view of R. Yosef Karo was that a *kezayis* is the size of a regular olive. One might claim that since he quotes the view of Ri, this indicates that he was working within the Ashkenazi approach, which therefore makes it unlikely that he himself viewed it as being a much smaller quantity. But

³¹ Responsa *Vayomer Yitzchak, Orach Chaim* 8. See too *Ner Mitzvah* 17 and Benish, *Middos VeShiurei Torah* p. 254 note 111 and p.527.

³² *Orach Chaim*, 368:3; 409:7.

on the other hand, the fact that he does not specify what he considers to be the normative view (only quoting what “some say” it to be) could indicate that he considered the normative view to be obvious – namely, that a *kezayis* is the size of an olive. This is especially likely in light of the fact that R. Yosef Karo himself, unlike Ri and Rabbeinu Tam, would have been familiar with olives.

Whichever way one understands R. Karo, it seems that the *Shulchan Aruch* denotes a critical point of transition; in recording the explicit view of the Ashkenazi Rishonim and being silent about the silent Sefardic Rishonim, it thereby strengthens the impression that Ri was the mainstream view and Rabbeinu Tam, interpreted maximally, was the alternative.

Reasons for the Ashkenazi Adoption

When later authorities who were familiar with normal olives nevertheless followed the positions of the Ashkenazi Rishonim, they were implicitly adopting the notion that olives of ancient times were larger. Some were explicit about this. For example, in adopting the view of Ri that an olive is half the size of an egg, Rabbi Shlomo Luria (Poland, 1510-1574) writes as follows:

It is a received tradition in our hands from the Tosafists that an olive is half the size of an egg. And even though in our time we see with our eyes that the size of an olive is much smaller than half of an egg, this is not surprising, for in the days of the Sages the fruit of the Seven Species were unusual in their size, and they have since changed. (*Yam Shel Shlomo, Chullin* 3:86, also cited in Taz, *Yoreh De'ah* 44:12)

R. Yaakov Yisrael Kanievsky (1899-1985) similarly writes that although the strain of olives found today is the same as that mentioned in the Mishnah, “it has become weak and the fruit have become smaller”³³ (however, as we shall see, he was not of the view that the earlier larger size is to be replicated).

We have seen that the botanical and archeological evidence shows that olives were always the same size as they are today. But the belief that they used to be larger was consistent with a general worldview of the “decline of generations”—that the world used to have a golden age in which people, animals and plants were superior in every way to those of today. The most radical application of this concept to the size of the *kezayis* was that of R. Yechezkel Landau, which we shall now explore.

The Alleged Egg Shrinkage

R. Yechezkel Landau (Poland/Bohemia, author of *Noda B'Yehudah*, 1713-1793) created a famous revolution in the determination of halachic quantities.

³³ *Shiurin Shel Torah* p. 8.

Since a mitzvah performed at a designated time is precious, and on this night we are required to eat a *kezayis* of matzah and *maror* and to drink a Torah-determined *revi'is* of the four cups, I need to clarify my view concerning the size of a *kezayis* and a *revi'is*, which I concluded by way of proofs is not in accordance with the words of the *Shulchan Aruch*. For in truth it is clear in the *Shulchan Aruch*, chapter 486, that the size of a *kezayis* is half the size of an egg. However, it is clear to me by way of measurement that with the eggs that we have in our day, a whole egg of our day is only half the size of an egg that was used for the Torah quantities... (*Tzlach, Pesachim* 120a)

R. Landau proceeds to describe his measurements which resulted in a ratio of thumbs to eggs that differed from the ratio that results from the Talmud. He continues:

And against our will we see that things have changed in our time; either thumbs have grown, and they are bigger than the thumbs of the days of the Tannaim, or the eggs have shrunk and in our day they are smaller than the eggs of the era of the Tannaim. And it is known that the generations progressively decline, and it is therefore impossible that our thumbs should be larger than the thumbs in the day of the Sages of the Mishnah. (*Ibid.*)

R. Landau therefore concludes that the eggs mentioned in the Talmud were larger, and his calculations enable him to conclude that they were twice as large:

It is therefore necessarily the case that the eggs of our day are smaller... and since it has become clear that our eggs are smaller by half, therefore the size of a *kezayis*, which is (originally) half an egg, is as the size of a whole egg of today. And thus I evaluate the eating of matzah and *maror*... (*Ibid.*)

Many authorities adopted the view of R. Landau.³⁴ In some cases, they only did so vis-à-vis measurements dependent on thumbs, such as *challah* and *revi'is*, but not vis-à-vis measurements dependent on eggs, such as a *kezayis*.³⁵ But others adopted it for eggs (and calculated the volume of today's eggs as being 50cc and that of eggs in ancient times as being 100cc) and thus for the *kezayis* too, such as R. Yisrael Meir Kagan (Poland, 1838-1933) in the *Mishnah Berurah*:

...And with regard to the ruling, with a Biblical mitzvah, such as the positive commandment of eating matzah, one should be stringent and eat at least the volume of half an egg... and know that what the *Shulchan Aruch* wrote about a *kezayis* being half an egg is not a final statement in our day, for some of the Acharonim proved that the eggs found in our day are much smaller, as much as half, of the eggs that were in ancient times, with which the Sages gave their measurements. Accordingly, wherever the required quantity is half an egg, one

³⁴ Vilna Gaon, *Maaseh Rav* 105; R. Akiva Eiger, *Responsa R. Akiva Eiger HaChadashos* 39; *Beis Ephraim, Rosh Ephraim, Kuntrus HaTeshuvos* 16.

³⁵ Chasam Sofer, *Responsa Chasam Sofer Orach Chaim* 127, 181; *Responsa Gidulei Taharah* 1; R. Chaim of Volozhin, as per *Shaarei Rachamim* 165 and at the end in *Minhagei HaGraCh* 51.

needs to measure this as a whole egg of our day.... According to this, in our day a person is obligated to eat matzah of the size of an egg... (*Mishnah Berurah*, 486:1)

Note the three steps taken in the *Mishnah Berurah* which result in this gigantic measurement of 50-60cc for a *kezayis*.³⁶ First is that, again, we have a presumption that the obligation is to consume the presumed size of an olive of ancient times, not an olive of today – which is in contrast to the view of the Geonim. Second is that he states that one should follow the stringent view that a *kezayis* is half an egg – which we have seen to be based on the Ashkenazi Rishonim not being familiar with olives. Third is that he claims that the Acharonim *proved* that eggs have shrunk – which we shall now demonstrate to be incorrect.

Evaluating the Alleged Egg Shrinkage

From a rationalist perspective, Rabbi Landau's claim that the relative sizes of thumbs and eggs has changed, and that it must be that eggs have shrunk rather than that thumbs have grown, is problematic on several counts. First, we know that thumbs have indeed grown; second, we know that eggs have not shrunk. As for his difficulty regarding the apparently changed ratio, there are other solutions. Let us explore these three points in turn.

R. Landau's belief that people could not have grown larger was based on his understanding of the decline of generations. The concept of a "decline of generations" sets traditionalists squarely against rationalists, depending on how it is defined.³⁷ But even if one accepts the notion of a general spiritual and/or intellectual decline, R. Landau's extrapolation to a *physical* decline is quite a leap. Furthermore, evidence from archeology shows that between the Talmudic era and the era of R. Landau, mankind did not become any shorter; in fact, beginning in the 18th century, people began to grow taller.³⁸

With regard to R. Landau's claim that eggs have become smaller, R. Eliezer Waldenberg points to the aforementioned responsa of the Geonim, which state that halachic measurements are given in terms of eggs because they remain constant in size.³⁹ In fact, empirical research shows that eggs in ancient times, far from being twice the size of today's eggs (which measure 50-60cc), were actually

³⁶ The range of 50-60cc is due to the different assessments of the volume of a contemporary egg.

³⁷ Menachem Kellner, in *Maimonides on the Decline of Generations*, argues that Maimonides did not subscribe to this doctrine as a general pattern.

³⁸ R. Elazar Fleckeles, a disciple of R. Landau, is recorded as having claimed that R. Landau reached his conclusion due to his own thumb being unusually large, reflecting his tall stature. See David Katz, "A Case Study in the Formation of a Super-Rabbi: The Early Years of Rabbi Ezekiel Landau, 1713-1754," (PhD dissertation, University of Maryland, 2004)

³⁹ R. Eliezer Waldenberg, *Tzitz Eliezer* vol 13, 76:3.

smaller than those of today. There are several independent lines of evidence for this.

One argument, concerning the size of eggs in Rambam's era, is based on his relating the size of an egg to certain Arab coins. R. Chaim Na'eh (1890-1954) used this technique to calculate the size of eggs in Rambam's day as being 57.6cc.⁴⁰ However, R. Chaim Beinish states that the coin of Rambam's era was of a different weight than that known to R. Chaim Na'eh, and it results in an egg size of 49cc.⁴¹ The fact is that the size of Arab coins varied tremendously in different places and eras, which makes any such calculation questionable,⁴² but there are many other more reliable forms of evidence.

The Talmud records that R. Yehudah HaNasi measured a vessel called the *modia* or *modius* as containing the volume of 217 eggs.⁴³ We know that the *modius* was one-third the size of a standard Roman measuring vessel called the amphora, and we are able to measure extant amphoras at one cubic Roman foot, which equals 25.79 liters.⁴⁴ This means that the eggs of R. Yehuda HaNasi's era measured 39.6cc.⁴⁵

Professor Yehudah Feliks examined eggs that were preserved whole in the volcanic destruction of Pompeii two thousand years ago, and states that they were "around the size of the small Arab eggs of our time," which he defines as 41.4cc.⁴⁶

My own research indicates that the eggs of ancient times were considerably smaller than those of today. Domestic fowl have been selectively bred for larger eggs, which would mean that eggs used to be smaller. Furthermore, we know that the domestic chicken was domesticated from the red junglefowl several thousand

⁴⁰ *Shiurei Torah* (Jerusalem 1947) pp. 111-120.

⁴¹ *Middos VeShiurei Torah* 13:7 and 30:6.

⁴² See, for example, Stefan Heidemann, "The Merger of Two Currency Zones in Early Islam. The Byzantine and Sasanian Impact on the Circulation in Former Byzantine Syria and Northern Mesopotamia," *Iran* 36 (1998) pp.95-112.

⁴³ *Eruvin* 83a. The Talmud further states that R. Yehudah HaNasi had a tradition that this vessel held the volume of 207 eggs of the size that existed at the time of the Revelation at Sinai, and attributed the slight difference of about 5% to the natural change in egg size over so many years.

⁴⁴ Lesley Adkins, Roy A. Adkins, *Handbook to Life in Ancient Rome* (Oxford University Press 1998), p. 314.

⁴⁵ There is some dispute regarding the precise size of the *modius*. Greenfield, "Has the Egg Volume Really Decreased in the Thousands of Years since Matan Torah?" (Hebrew) *BDD* 16 pp. 91-94 concludes that the egg had a volume of 43cc.

⁴⁶ Feliks, *Kelai Zera'im VeHarkavah*, p. 184 note 5.

years ago, and its eggs are very small, only 32.1cc.⁴⁷ Assuming a gradual increase to the size of today's eggs, this would indicate that two thousand years ago, eggs were around 40cc. In addition, records show that the chickens used in Roman Italy were able to incubate twice as many eggs at a time than chickens of today are able to do, which shows that their eggs were much smaller.⁴⁸

We thus see that, contrary to R. Landau's assertions, neither thumbs nor eggs are smaller than those of ancient times. As for R. Landau's question regarding the apparently changed ratio of eggs to thumbs, other solutions have been presented.⁴⁹ In fact, the eggs of ancient times were slightly smaller than those of today; according to my research, around 40cc. This may also assist in solving the difficulty in the olive-egg ratio implied by the Talmud's statement regarding a person being able to swallow a whole egg or two olives.

Recent and Contemporary Poskim

The *Mishnah Berurah*, as noted above, rules that for Biblically-ordained mitzvot one should follow R. Landau's conclusion that the eggs of ancient times were twice the size of today's eggs. But most authorities rejected the notion that one should double the size of the measurements. R. Elchanan Wasserman (1875-1941) noted that based on the words of R. Hai Gaon (that we cited early in this study), the size of eggs and olives does not change.⁵⁰ R. Chaim Na'eh, a prominent rabbinic authority in Jerusalem, compiled an extensive study of halachic weights and measures. As noted above, he concluded that R. Landau had erred about eggs in ancient times being larger than those of today. On the other hand, R. Avraham Yeshayah Karelitz (the "Chazon Ish," 1878-1953) wrote that regardless of whether it is factually true that eggs have halved in size, since this was the assessment of R. Landau and others, and it has become widely accepted, it is as though it has been established by a Beis Din for all Israel and is binding.⁵¹

⁴⁷ Gardiner Bump, *Special Scientific Report 62: Red Junglefowl and Kalij Pheasants* (Washington DC: U.S. Fish & Wildlife 1962), gives the dimensions of the egg as 4.53x3.44cm (compare large chicken eggs at around 5.7x4.4cm). Using the calculation $V = (0.6057 - 0.0018B)LB^2$ in which L is the egg length, and B is the egg maximum breadth, the volume is 32.14cc. The calculation is from V.G. Narushin, "Egg Geometry Calculation Using the Measurements of Length and Breadth," *Poultry Science* 84:3 (March 2005) pp. 482-484.

⁴⁸ George Jennison, *Animals for Show and Pleasure in Ancient Rome* (Manchester University Press 1937), p. 106, citing Pliny, Varro and Columella.

⁴⁹ Avraham Greenfeld, "Middah Kenegged Middah," *Moriah* 10 (5742). This provoked heated responses; see, for example, R. Kalman Kahana, "Lo Zu HaMiddah," *Moriah* 11 (5743) 11-12 pp. 67-76.

⁵⁰ *Kobetz Shiurim* 2:46.

⁵¹ Chazon Ish, *Kuntrus HaShiurim* 39:6. However, as we shall soon see, this was far from R. Karelitz's last word on the topic.

Putting aside the issue of whether one assumes that eggs used to be twice the size, what proportion of an egg is a *kezayis*? R. Avraham Danzig (*Chayei Adam*, 1748–1820)⁵² rules that a *kezayis* is half an egg, as does R. Yechiel Michel Epstein (*Aruch HaShulchan*, 1829-1908).⁵³ R. Yisrael Meir Kagan (*Mishnah Berurah*, 1838-1933) rules that when following the stringent view (e.g. for Biblically-ordained mitzvos such as eating matzah at the *seder*) one should follow the stringent view of Ri cited in the *Shulchan Aruch* that a *kezayis* is half an egg. R. Chaim Na'eh also states that for such mitzvos one should follow the view that a *kezayis* is half an egg and specifies this as being 28.8cc.⁵⁴

Partly because R. Chaim Na'eh was the first to address the topic comprehensively, and partly due to his stature, many of his conclusions became widely accepted. Thus, the most widespread view today concerning a *kezayis* is that it measures 28.8cc. This is based on following the stringent view of Ri along with the egg calculation of R. Chaim Na'eh. This view has been advanced by authorities such as R. Shlomo Zalman Auerbach⁵⁵ (1910-1995) and R. Yosef Shalom Elyashiv.⁵⁶ It is also the standard adopted for R. Pinchas Bodner's popular work *The Halachos of Kezayis*.

A less widespread view is that a *kezayis* is 17cc. This is based on following what is presumed to be the *Shulchan Aruch's* own view, following Rabbeinu Tam and Rambam, that a *kezayis* is slightly less than 1/3 of an egg. The aforementioned recent and contemporary authorities also propose that one may rely on this "leniency" for rabbinically-mandated requirements, especially when it is difficult to rely on the larger quantity, such as when eating *maror* at the *seder*.

Yet even in recent times there were still those who maintained that a *kezayis* is the size of an ordinary olive. As noted at the beginning of this study, R. Chaim of Volozhin is one such example. When the manuscripts of the Geonim came to light around 130 years ago, revealing their view that one is to follow the size of the fruit of one's own era, some adopted this position. As noted earlier, Rabbi Akiva Yosef Schlesinger (1835-1922) writes:

The measurement of an egg is not found in the Torah; rather, it says, "a land of... olives" etc., that all its measurements are like olives, and this olive was only rated by the measurement of an egg for those who did not have olives. But not for us, who

⁵² *Chayei Adam* 50:12

⁵³ *Aruch HaShulchan* 202:5 and 486:1.

⁵⁴ See R. Chaim Na'eh, *Shiurei Torah*, 3:12 p. 193.

⁵⁵ *Halichos Shlomo* vol. II p. 90.

⁵⁶ *Kobetz Teshuvos* II:30.

see the olive in front of us—there is no need to push aside the *ikkar* for the *tafel*. (*Tel Talpios*, Shevat 5661 p. 103)

R. Yitzchak Elchanan Spektor (1817-1896) likewise stated that the Geonic view is the fundamentally correct approach.⁵⁷ Apparently following the same approach, R. Avraham Bornstein (1838-1910, author of *Avnei Nezer*) maintained that the *kezayis* is the size of an ordinary olive and did not see any basis for expanding it to half the size of an egg, even as a stringency.⁵⁸ R. Yaakov Yisrael Kanievsky (1899-1985) states that we follow the size of today's olives regardless of the presumed greater size of olives in ancient times.⁵⁹

The same was stated by R. Avraham Yeshayah Karelitz (the “Chazon Ish,” 1878-1953), but there is much confusion and dispute with regard to his ultimate ruling. At one extreme, in some editions of his chart for the measurements of *shiurim*, he gives a measurement of 50cc for a *kezayis*. This view reflects his acceptance of R. Landau's radical expansion of the *kezayis*, based on the assumption that eggs have halved in size. Elsewhere he states that if one wishes to be stringent, one can follow the view of the Ri that a *kezayis* is half the volume of an egg.⁶⁰ The combination of these positions results in a *kezayis* measuring 50cc – half the presumed volume of an egg in ancient times. But at the other extreme, Chazon Ish writes that the essential concept of *kezayis* is that one follows the dimensions of olives that one observes and one does not need to concern oneself with calculating if olives in an earlier era were larger.⁶¹ An intermediate position emerges from an account by R. Chaim Kanievsky that at the *seder* of the Chazon Ish, he allocated portions that were 17cc in size.⁶² Reconciling all these conflicting statements and accounts is difficult, and varying conclusions have been drawn.⁶³ Suffice it to say that while it is “common knowledge” that a “Chazon Ish *shiur*” is the largest

⁵⁷ Quoted by R. Dov Aryeh Rotter, *Tel Talpios*, 5661 p. 71.

⁵⁸ Testimony recorded in *Middos VeShiurei Torah*, p. 510 note III.

⁵⁹ *Shiurin Shel Torah* II p. 71. Puzzlingly, however, he rates the size of a contemporary *kezayis* as being slightly less than a third of the size of an egg (17-19cc).

⁶⁰ *Ibid.* 39:17.

⁶¹ Chazon Ish, *Shiurin Shel Torah* II; Letters, 194.

⁶² Related by R. Hadar Margolin, “A Clarification of the View of the Chazon Ish,” *Moriah* 3-4 (5753) p. 102.

⁶³ See R. Hadar Margolin, “A Clarification of the View of the Chazon Ish,” *Moriah* 3-4 (5753) pp. 99-103 and R. Moshe Petrover, “The Volume of a *Kezayis* for Eating Matzah – A Clarification of the View of the Chazon Ish,” *Moriah* 7-9 (5754) pp. 106-109. See too Menachem Friedman, “The Lost Kiddush Cup: Changes in Ashkenazi Haredi Culture - A Tradition in Crisis,” in Jack Wertheimer, ed., *The Uses of Tradition: Jewish Continuity in the Modern Era*, (New York: JTS/Harvard University Press 1992), pp. 175-186.

measurement for a *kezayis*, the truth is far more complex and it seems that he acknowledged that fundamentally a *kezayis* is the size of an ordinary olive.

The Canonization and Conservatism of Halacha

Given the botanical/archeological evidence and the discovery of the Geonic manuscripts, both of which independently show that there is no reason to exceed the size of a contemporary olive, why is it that there are so many who rule otherwise? Of course, in the Charedi world, it is common to treat scientific evidence with suspicion. But there is another reason why many adopt the position that a *kezayis* is much larger than olives are today: the nature of the halachic process in general. The question of whether halachic practice should be changed in light of new empirical data or newly discovered manuscripts is complex. There is a strong case to make for saying that halachah follows its own protocols and should not be re-evaluated in light of new data, even if it seems clear that the halachah is in opposition to objective facts.⁶⁴ A fundamental value in halachah is creating and preserving stability. If a halachah has become canonized, then it ought not to be changed.

However, this case has two factors that make it easier to rely on the new data if one wishes to do so. One is that upon closer inspection, the halachah is not at all canonized in the way that it is commonly assumed. The primary authorities who are assumed to have ruled that a *kezayis* is 1/3 of an egg, Rambam and Rabbeinu Tam, in fact did not say any such thing; it is only the upper limit of a *kezayis* that can be inferred from them. The same may well also be true of the *Shulchan Aruch*.

The second factor is that this is not a case where the halachah was ruled unequivocally in one direction. There have always been those, such as Rabbi Chaim of Volozhin, the *Avnei Nezer* and others who maintained that the *kezayis* is the size of an ordinary olive. Even the Chazon Ish acknowledged that this is the fundamentally correct position. It is thus an established halachic view, which is merely being given greater weight in light of new discoveries of manuscripts and new data concerning olives and eggs.

Yet while this justifies someone who wishes to evaluate a *kezayis* as being the size of a regular olive, we can still understand why others do not take this approach. Even if a halachah has not been unequivocally canonized, it can still be sufficiently entrenched that it becomes problematic to change. Orthodox Judaism is a traditionalist way of life, and traditionalist religions are inherently and necessarily conservative.

⁶⁴ See Natan Slifkin, *Sacred Monsters*, pp. 362-367.

Further Growth – Weight Replaces Volume

Another factor that is sometimes involved in the expansion of the *kezayis* is the change from measuring volume to measuring weight. There is no doubt that the *kezayis* is supposed to be a measure of volume, and there are several independent lines of evidence for this. First is a Mishnah which appears in a chapter discussing how to evaluate the quantity of a food:

An airy loaf is evaluated as it is. If there is a hollow inside, it is compressed.
(Mishnah, *Uktzin* 2:8)

The Mishnah tells us that an airy loaf, which is much less dense than other foods, is nevertheless evaluated as it is, and not compressed into a density comparable to other foods. Only if there is actually a distinct large single pocket of air is it to be removed from the equation. This clearly means that it is volume being measured rather than weight. This position, emerging from this Mishnah, is found in a number of halachic authorities.⁶⁵

We also have an explicit statement from the Geonim that *kezayis* is a measure of volume rather than weight:

And that which you asked regarding the measure of... a *kezayis* etc., surely these are *shiurim* (designated quantities), and how can there be a designated quantity for a designated quantity? And if you suggest to give a weight, our rabbis did not explain things in terms of their weight, and the Holy One does not exact with us in weight.
(*Teshuvos HaGeonim* 268)

Finally, the discussions of Rabbeinu Tam, Ri and others regarding the calculation of a *kezayis*, which were based on reconciling various statements in the Talmud concerning how much a person can hold in his throat, only make sense if the discussion is regarding volume. Yet we do find several later halachic authorities stating a weight measure for an egg, a *kezayis*, and so on. R. Yaakov Chaim Sofer (1870-1939) cites several such authorities, and affirms that this is widespread custom amongst all God-fearing Jews.⁶⁶ He concludes that since an egg weighs 18 *drahms* and a *kezayis* should be half an egg, a *kezayis* is 9 *drahms*. But how are we to understand these halachic authorities in light of the clear positions in the Mishnah, Geonim and Rishonim that we cited above?

There are two reasons why we nevertheless find some halachic authorities prescribing measures of weight rather than volume. One is that it is sometimes

⁶⁵ Rama, *Orach Chaim* 486:1; Magen Avraham 486:1; Chida, *Machzik Berachah* 486:2; *Mishnah Berurah* 486:3. See too *Shulchan Aruch*, *Orach Chaim* 456:1; Chazon Ish, *Orach Chaim* 39:17.

⁶⁶ *Kaf HaChaim* 168:46, citing *Bnei David*, and *Pesach HaDvir*, who in turns cites several others.

more convenient to prescribe quantities in terms of weight, especially since it is less likely to cause measuring errors. For this reason, some halachic authorities converted measures of volume to measures of weight. But this does not mean that they considered the halachic requirement to be essentially one of weight. In fact, it is pointed out that R. Yaakov Chaim Sofer, as well as all the halachic authorities that he cites, themselves make it clear elsewhere that halachic measures are all volume rather than weight.⁶⁷

The second reason why some convert the measurement to weight is that, as we have seen in the Mishnah, large air pockets are not to be included in the calculation. However it is difficult to draw the line between a large air pocket and a small one. R. Chaim Na'eh therefore rules that *any* visible air pocket is not to be included in a volume measurement.⁶⁸ Since it is difficult to calculate the volume of a food item without any air pockets, a weight measure was sometimes substituted. It should be stressed, though, that R. Chaim Na'eh himself explicitly stated that the essential definition is one of volume, and that he was only converting it to weight due to this uncertainty and subsequent stringency.⁶⁹

However, R. Chaim Na'eh's stringency in this regard was widely rejected. Contemporary halachic authorities are emphatic that the *kezayis* is to be measured by volume, not weight.⁷⁰ Nevertheless, in popular discourse, a *kezayis* is often defined in terms of weight – specifically, 30 grams. It is this that leads to the greatest quantity of matzah designated as a *kezayis*: the labeling on certain machine-made matzah stating that one whole matzah equals a *kezayis*.

Conclusion

At the beginning of this study, it was noted that logically, in order to reach the conclusion that a *kezayis* is much larger than olives are today, two separate positions must both be taken: First, that olives of ancient times were much larger, and second, that we are obligated to follow the size of ancient olives rather than the olives of today.

⁶⁷ R. Eliyahu Topik, *Responsa Kol Eliyahu, Orach Chaim* 30, p. 137, pointing to *Kaf HaChaim* 456:10, *Pesach DaDvir, Kisei D'Chayay* 196a, and others; Chida, *Machzik Berachah* 486:2. A similar point is made by R. Chaim Na'eh, in *Shiurei Torah* 1:1, pp. 71-72.

⁶⁸ *Shiurei Torah* pp. 182-184.

⁶⁹ *Shiurei Torah*, 1:1, pp. 71-72. In a subsequent work, *Shiurei Tziyon* p. 18, he himself expressed reservations about his innovation.

⁷⁰ R. Avraham Yeshaya Karelitz, *Chazon Ish, Orach Chaim* 39:17; R. Tzvi Pesach Frank, *Chag Ha-Asif* p. 316; R. BenZion Abba-Shaul, *Responsa Ohr LeTziyon* p. 124; R. Ovadiah Yosef, *Chazon Ovadiah*, vol. II p. 518.

The first is refuted by empirical evidence. We have living trees from the Talmudic era, which produce olives that are exactly the same size as olives from the trees of our own era, and we have olive pits from ancient times that are similar to those of today. Furthermore, there is no testimony otherwise in any source in the Talmud or Rishonim (contrary to popular belief). In fact, there is testimony from some of the Rishonim that olives were the same size as those of today. Alleged indications from inferences regarding eggs having been larger are likewise disproved by evidence that eggs of ancient times were actually smaller.

The second position, that we are obligated to follow the size of ancient olives, was assumed by many authorities, but it is explicit in the Geonim, implicit amongst many Rishonim and acknowledged by several recent authorities that there is no such obligation.

An olive measures 4-6cc. How did it arise that virtually all halachic authorities are ruling that a *kezayis* is at the very least 17cc, and most are ruling that it is in the region of 28cc or even 50cc and more? We have seen that a combination of seven factors was involved:

- As some of them explicitly admit, the Rishonim of Ashkenaz were working with the basic disability of not being familiar with olives. In one case this led to interpreting the Talmud to mean that an olive is half the size of an egg, and in another case, it led to only being able to calculate an upper limit for an olive's possible size.
- The Rishonim of Sefarad, who were familiar with olives, never saw a need to discuss their size. Their silence on the matter led to a fundamentally misleading situation: from the discussion in the period of the Rishonim, the impression arises that there is a divide between those who rate it as measuring $\frac{1}{3}$ of an egg and those who rate it as $\frac{1}{2}$ an egg. Thus it was those who were not familiar with olives, and thereby increased its size, who formed the framework for subsequent halachic discussion.
- The view that an olive must be *less than* $\frac{1}{3}$ of an egg, which was explicit in Rabbeinu Tam and inferred from Rambam, was simplified/misunderstood to mean that an olive is *equal to* slightly less than $\frac{1}{3}$ of an egg.
- Difficulties with resolving various questions led to the belief that eggs and/or olives of ancient times were vastly larger than those of today. Given the lack of scientific knowledge, the understanding of the decline of generations from a golden age, as well as the intellectual climate that was pervasive at the time, this was seen as a reasonable position.

- The manuscripts from the Geonim stating that one need only follow the size of olives of one's era were only discovered and published relatively recently, as was also the case with the statements of Rashba and Ritva that olives are very small.
- The substitution of measuring by weight rather than volume, initially instituted for convenience, led some to believe that matzah ought to be measured this way. Since matzah is very lightweight, this resulted in a huge increase in volume.
- Finally, the process of halachic tradition, with its canonization and conservatism, meant that even when the above factors came to light, it was too late; the rulings had already become entrenched.

Those who have attempted to prove that a *kezayis* is the size of a regular olive have encountered strong opposition. Understanding how the alternate views arose is the key to both understanding the cause of this opposition and to overcoming it.

Postscript: Why On Earth Would Anyone Eat A Kezayis?

The reaction of many people to my conclusions about the *kezayis* is one of shock, followed by the question: "So do you yourself really eat such a small portion of *matzah* and *maror*?" Yet this is a very strange question. It sheds light on the problems caused by the evolution of the large *kezayis* measurement.

Why on earth would anyone only eat an olive-sized portion of *matzah*? The mitzvah comes late at night, after a really long day, when people haven't eaten for hours. Any normal person will eat much more than an olive-sized portion!

The *kezayis* is a *minimum*. The halachah says that eating anything less than a *kezayis* is simply not called an act of eating. But any ordinary act of eating is obviously more than the bare minimum! Does anyone build a sukkah ten *tefachim* high?!

So why do so many wonder if people like me will be eating an olive-sized portion? This is probably because the evolution of the large *kezayis*, along with the change from traditional *maror* (wild lettuce, sowthistle, etc.) to horseradish, has made eating a *kezayis* such a tricky and stomach-challenging ordeal that this is all that people aim for. The *Mishnah Berurah* states⁷¹ that ideally, one should swallow the *kezayis* in a single gulp (after chewing it), which is extraordinarily difficult with enlarged sizes. Many are lenient to chew and swallow it *toch k'dei achilas pras*,

⁷¹ *Mishnah Berurah* 475:9.

“within the amount of time required to eat half a loaf of bread,” which is the maximum time permitted for it to still be defined as a proper act of eating; yet even this presents a challenge with a jumbo-sized *kezayis*. Thus, people struggle to eat the *minimum* amount of food within the *maximum* time allowance!

Kezayis becomes not the minimum, less than which is simply not an act of eating, but rather the challenge, the goal. And people become so focused on eating the right quantity that this becomes the main thing that they think about – the quantity, rather than the mitzvah itself. But when you eat traditional *matzah*, and traditional *maror* (which was the normal *hors d’oeuvre* in antiquity), and a *kezayis* is a *kezayis*, nobody would only eat a *kezayis*. And instead of focusing on the quantity of what they are eating, they focus on its significance.

Rabbi Natan Slifkin teaches at Yeshivat Lev HaTorah and is the author of numerous books and articles. His work can be found at www.zootorah.com and www.rationalistjudaism.com.

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