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Talmudic Metrology V

Halakhic Coinage in the Post-Talmudic Period

The Rabbis of the post-Talmudic period and the Middle Ages had a good knowledge of Talmudic coinage, and certainly owned samples of the *shekel* struck during the Roman war of 66-70 CE. The *geonim* overestimated the weight of the *shekel* by 20 percent, and considered that it weighed 17 gr, the weight of four golden Arabic *dinar* of 4.25 gr. The German Rabbis, like R. Gershom ben Judah Meor Ha-Gola of Mainz and Rashi, had a very accurate knowledge of the weight of the Talmudic *shekel*, which they estimated at about 14 gr.

We examine Maimonides' halakhic coinage, and return to the contradiction between his Commentary on the Mishnah and his *Hibbur* about the weight of the Egyptian *dirham*. We propose a new theory to solve this conundrum, and suggest a small change in the text of Hilkhot Bikkurim VI: 15 that permits complete unity between the different sources.

We examine the German tradition of the *shekel*, based on the standard of Köln, and show that the standards of Köln and of the Tower were practically equal. Through the analysis of several texts, we show that there was only one standard of Köln, and that both the iron market and the silver market – to which Rashi and the German Rabbis refer – were probably the two official weighing institutions, the *mishkal ha-barzel* and the *mishkal ha-yashar*, but they both worked according to the standard of Köln.

We examine the alleged undervaluation of the *shekel* by R. Tam in the rabbinic literature, Nahmanides' position on halakhic coinage and its evolution, and also the position of Estori ha-Parhi and his discussion on the opinion of former authorities.

In a recent paper we have seen that the *shekel* or *sela* prescribed by the Rabbis was, during the first century before the Common Era and during the first century of this era, identified with the Tyrian *tetradrachma*. It was a silver coin of high fineness, of about 92 to 95 percent, according to the periods, weighing about 14.17 gr.

During the Jewish war against the Romans, between 66 and 70 CE, the Jewish authority struck its own money, and also a silver *dinar* and *shekel* of a similar weight to the correspondent Tyrian denominations. In fact, these coins were

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generally over-struck on Roman coins. These coins still had a good fineness, therefore, but their weight presented an important deviation.

In third- or fourth-century Babylonia, the Talmudic *dinar* was probably assimilated to the Sassanid *dinar*, and the *shekel* or *sela* to four Sassanid *dinar*, which weighed about 4 gr. Later, at the beginning of the seventh century, when the Arabs established their rule in these countries and introduced the golden *dinar*, the *shekel* was considered as a silver coin weighing four golden Arab *dinar* or 17 gr.

The golden Arab *dinar* would maintain its weight during many centuries, and would be used throughout the entire Arab empire. This allowed a good knowledge and the great stability of the Talmudic *dinar*. In B. Bekhorot 50a, we find an exceptional interpolation dating from the gaonic period, stating that the five *selaim* of the redeeming of the firstborn, which is five *shekel* or 20 Talmudic *dinar*, weighed the equivalent of twenty golden Arab *dinar* (מתקל) or 28.5833 *dirham* (זוזי). As the Arab *dinar* weighed about 4.24-4.25 gr, the *dirham*, during the gaonic period, weighed about 2.97 gr. Rashi, *ad locum*, was aware that the Babylonian *dirham* weighed 0.7 of the golden Arab *dinar*, as he had found this described in gaonic responsa, but he didn't know the weight of this golden Arab *dinar*. Rashi thought that this golden coin had the same weight as the golden coins in contemporary use in Köln, weighing about 3.5 gr. The *shekel* thus weighed about 14 gr, and corresponded perfectly to the weight of the extant exemplars of the *shekel*. Therefore, Rashi could interpret correctly the gaonic interpolation without being influenced by the Babylonian appreciation of the weight of the *sela*; but, of course, he was considering a fictitious Babylonian *dirham* of $0.7 \times 3.5 = 2.45$ gr.

Tosafot understood more clearly that this passage was a later interpolation from the gaonic period, giving the expression of the twenty *dinar* of the redeeming of the firstborn in money of their time or, more precisely, giving the weight of the halakhic silver coinage in coins of their time, these coins serving as units of weight.

1. MAIMONIDES AND THE HALAKHIC COINAGE

Maimonides was familiar with the golden Arab *dinar* and thus knew exactly the gaonic tradition of the *shekel* – of about 17 gr. Maimonides specifies that this weight corresponds to fine silver; which seems to be in contradiction with the historical data, according to which the Tyrian *sela* had a fineness of 92-95 percent. We also have proof that Maimonides knew of the *sela* of the Jewish war. He indeed writes¹ that the *shekalim* bore inscriptions in old *ketav ivri* or Phoenician characters;

1 *Tshuvot ha-Rambam*, ed. Joshua Blau (Jerusalem, 5720), Vol. 2, responsum 268, pp. 510-15.

they certainly correspond to those struck during the Jewish war. Now, since we know that they weighed about 14 gr, we can conclude that Maimonides must have considered them as older *selaim* from the period preceding the revaluation of 20 percent. It is indeed noteworthy that $14.17 \text{ gr} \times 1.20 = 17 \text{ gr}$.

Despite the fact that coins and currency are likely to change faster than units of weight, the Arab world seems to have used their coins as units of weight, and Maimonides also made use of the Arab golden *dinar* and the Egyptian *dirham* as units of weight.

The System of Talmudic Weight Described in his *Hibbur*

This system is the best known, and was discussed in the rabbinic literature and Halakhah.

Hilkhoh Erubin I, 12:

1 Talmudic *dinar* = 96 barleycorns = 1 Arab golden *dinar* = 4.25gr

1 *shekel* = 1 *sela* = 384 barleycorns = 17 gr

1 *revi'it* water = 17.5 *dinar* = 74.375 gr

1 *litra* = 35 *dinar*.

Maimonides follows the gaonic tradition and fixes the weight of the *sela* to four Arab golden *dinar*, weighing about 17 gr. He writes explicitly that the biblical *shekel* was revalued by 20 percent of its former value to become the Talmudic *sela*.²

Hilkhoh Bikkurim VI; 15:

1 *omer* = 7.2 *log* = 28.8 *revi'it* = 43.2 eggs

1 *omer* of Egyptian meal = $86 \frac{2}{3}$ *sela* = 520 Egyptian *dirham* (Egyptian *zuz*).³

We can deduce that 1 *dinar* = 0.25 *sela* = $520 / (4 \times 86 \frac{2}{3}) = 1.5$ *dirham*⁴

1 *dinar* = 96 barleycorns and 1 *dirham* = 64 barleycorns

1 *dirham* = 2.83 gr.

2 See Hilkhoh Shekalim I: 2 and Hilkhoh Arakhim ve Haramim IV: 3.

3 *Kessef Mishneh ad locum* writes that the Egyptian *zuz* corresponds to the *dirham*. This can also be deduced from a comparison of this passage with the passage mentioned, of the introduction to the commentary on Mishna Menakhot, according which an *omer* of Egyptian meal weighs 520 *dirham*.

Similarly, R. Estori ha-Parhi writes that 1 *dirham* = 16 *kirt*.

4 This is already mentioned in the commentary *Kessef Mishneh ad locum*. R. Joseph Caro writes the same in Hilkhoh Kelei ha-Mikdash II, 3: ורע שדינר הוא משקל מיתקאל שהוא דרמא וחצי; והדרמא משקל ששים וארבע שעורות בינוניות.

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We can also deduce that 1 *revi'it* meal weighs 18.06 *dirham* or 12.04 *dinar*. The density of the Egyptian meal is then $12.04 / 17.5 = 0.69$.

The System of Talmudic Weight Described in his Commentary on the Mishnah

(following the readings of R. Joseph Kafih)

Mishna Shevi'it I, 4:

Expression of the Talmudic Mana in Arabic Weights

1 *mana* = 62 *rotel* + 7 2/3 ounces = 575,808 barleycorns = 25491.50 gr (1)

1 *rotel* = 16 ounces = 9216 barleycorns = 408 gr

1 ounce = 16 *dirham* = 576 barleycorns = 25.50 gr

1 *dirham* = 36 barleycorns = 1.59375 gr.

Maimonides used here the word *dirham* for a weight of 36 barleycorns.

It appears that the ratio (1) is only an approximation, because in fact

1 *mana* = 6,000 *dinar* = 576000 barleycorns = 62.5 *rotel* = 25500 gr.

Mishna Peah VIII, 5:

1 *maah* = 16 barleycorns

1 *dinar* = 6 *maah* = 96 barleycorns.

Mishna Bekhorot VIII, 8:

1 *shekel* = 24 *dirham*. Maimonides used here the word *dirham* for a weight of 16 barleycorns, which corresponds to the *maah*.

1 Egyptian *dirham* = 61 barleycorns. This is the definition of the Egyptian *dirham*.

1 *sela* = 6.25 *dirham* + 0.25 *kirt*.⁵ (1 carat = 1 *kirt* = 1 *kharouv* = 4 barleycorns)

5 *sela* = 31.5 *dirham*⁶

30 *sela* = 188 7/8 *dirham*⁷

50 *sela* = 314.75 *dirham*.⁸

5 This ratio is approximate: 6.25 *dirham* = 381.25 barleycorns, and we need 2.75 barleycorns to complete the 384 barleycorns corresponding to one *sela*. 2.75 barleycorns represent 0.69 *kirt*.

6 5 *sela* = 5 x 384 = 1920 barleycorns = 31.475 *dirham*.

7 30 *sela* = 30 x 384 = 11520 barleycorns = 188.8525 *dirham*.

8 50 *sela* = 50 x 384 = 19200 barleycorns = 314.7541 *dirham*.

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From all these ratios, it appears to be certain that the Egyptian *dirham* weighs 61 barleycorns or 2.70 gr.

Mishna Menakhot, Introduction 5:

1 *revi'it* of wine weighs = 26 Egyptian *dirham*

1 *revi'it* of olive oil weighs = 26 Egyptian *dirham* and some negligible barleycorns

1 *omer* (*shiur hala*) of Egyptian meal weighs 520 Egyptian *dirham*.

Mishna Eduyot I, 2:

1 *revi'it* wine = 26 Egyptian *dirham*

1 *revi'it* water = 27 Egyptian *dirham*

1 *revi'it* corn = 21 Egyptian *dirham*

1 *revi'it* meal = 18 Egyptian *dirham*

1 *omer* = 520 Egyptian *dirham*.

Mishna Kelim II, 2:

1 *revi'it* water = 27 Egyptian *dirham*.

Mishna Miqvaot VI, 2:

1 *kartov* = 1/64 *log* ~ 1.5 Egyptian *dirham*.

Mishna Bava Kama IX, 7:

From his commentary on this Mishnah it seems that 1/16 Egyptian *dirham* weighs 1 *kirt* or 4 barleycorns. We refer to the edition of the Mishnah with Maimonides' commentary by Kafih,⁹ and more specifically to the Judeo-Arabic version: "לגמרה רבע דרהם וכרובה" which should be translated by "חייב רבע דרהם וחריב"¹⁰ "He was indebted for one *dirham* and one *kirt*"; the second denomination being, by the context of the Mishnah, the fourth part of the first.

Thus, 1 *kirt* = (1/4) x (1/4 *dirham*) = (1/16) *dirham*¹¹

1 *dirham* = 16 *kirt* = 64 barleycorns.

9 The classical translation of this passage of Maimonides' Commentary is corrupted.

10 Kafih translated using the word *מעה* instead of *דרהם*. The word *maah* is incorrect and misleading because the *maah* is a coin weighing only 16 barleycorns.

11 The commentary of Maimonides on this Mishnah is problematic. Indeed, at the last stage, according to the Judeo-Arabic text, we must have the ratio:

(1/4) x 1 *kirt* < 1 *pruta*. However, this is not true: (1/4) x 1 *kirt* = 1 barleycorn = 2 *prutot*.

Therefore, we must wait for an additional step and write (1/4) x (1/4) x 1 *kirt* < 1 *pruta*.

Probably in order to avoid this difficulty, R. Joseph Kafih translated 1 *dirham* by 1 *maah*

This would give us an Egyptian *dirham* of 64 barleycorns, which contradicts Mishna Bekhorot VIII, 8. In fact, this is not exact: the *dirham*, which is of course an Egyptian *dirham*, still weighs 61 barleycorns, the quarter of the *dirham* weighs 15.25 barleycorns and the sixteenth of the *dirham* weighs 3.81 barleycorns. Maimonides has rounded off to 4 barleycorns or 1 *kirt*, which represents the weight of silver that one is obliged to pay as a fine of one *homesh*.¹²

The Contradiction between these two Systems in the Mishnah and the *Hibbur*

We observe a flagrant divergence between these two systems; the entire method, exposed at different places in the Mishnah, is always based on the ratio: 1 *dirham* = 61 barleycorns. On the other hand, in his *Hibbur*, in Hilkhhot Bikkurim, Maimonides writes, indirectly, that the *dirham* is 64 barleycorns. This would imply that the *dirham* considered in the Commentary on the Mishnah was 2.70 gr, while the *dirham* considered in the *Hibbur* weighed 2.83 gr. In “Talmudic Metrology III,” we concluded that the *dirham* was revalued, from 61 barleycorns to 64 barleycorns, between the time of Maimonides’ Commentary on the Mishnah and the time of his *Hibbur*. However, this explanation is not satisfactory:

A revaluation of the *dirham* does not seem likely.

We have no mention of such a revaluation. If such a revaluation actually happened, then Maimonides did not take it correctly into account. Note particularly that the *omer* of meal weighed 520 *dirham* in the Commentary on the Mishnah, and it still weighs 520 *dirham* in the *Hibbur*.¹³ We have also seen that the assumption of the revaluation obliges us to conclude that, without any comprehensible reason, Maimonides changed the density of meal.

Therefore, our assumption of a revaluation of the *dirham* is very problematic. We propose here an alternative resolution of this conundrum by suggesting the existence of a mistake in the text of Hilkhhot Bikkurim VI, 15: instead of 86 2/3 *sela* for the weight of the *omer* of Egyptian meal, also equal to 520 Egyptian *dirham*, the text should be 82 2/3 *sela*. Indeed, $520 \times 61/96 = 330.42 \text{ dinar}$ and $82 \frac{2}{3} \text{ sela} \times 4 = 330.67 \text{ dinar}$.

weighing 16 barleycorns and 1 *kharuv* by 1 grain of one barleycorn. But we do not find in Maimonides’ commentary a *dirham* of 16 barleycorns – and 1 *kharuv* is always a *kirt* of 4 barleycorns.

12 20 percent of the total amount, or 25 percent of the basic amount.

13 In the *Hibbur* he speaks of Egyptian *zuz*; in the Mishnah he speaks of the same amount of 520 Egyptian *dirham*. These two denominations must then be identical.

This probable mistake seems to exist in all the extant manuscripts. It is nevertheless unclear whether it was already extant in the text of the manuscript of the *Hibbur* used by R. Estori ha-Parhi,¹⁴ in which case it can be an early scribal mistake, or if it was a *lapsus calami* in the original manuscript.¹⁵ This solution solves all the problems raised by the former conclusions: there was no change in the weight of the *dirham*,¹⁶ no change in the meal's density, and no incoherency in Maimonides.

However, we observe that the *revi'it* water in the Commentary on the Mishnah weighed 27 Egyptian *dirham* or $27 \times 61/96 = 17.16$ *dinar*, while in the *Hibbur* it weighs about 17.5 *dinar*. This seems to be a slight modification in order to come to an agreement with the data of the *geonim*.¹⁷ Maimonides has increased his *revi'it* by 2 percent in order to make it correspond to the value of the *geonim*, but he made no changes to the other data; namely, the weight of the *omer* of meal remains equal to 520 *dirham* when it should have increased by 2 percent, to 530.4 *dirham*.

Conclusion:

The *sela* or Talmudic *shekel* weighs about 17 gr. Maimonides considers it to be a

14 See *Kaftor va-Ferah* chapter 16. He refers to Maimonides' commentary on the Mishna Bekhorot, parallel to our text, and to the Egyptian *dirham* of 61 barleycorns. He doesn't refer to the *Hibbur* and its reference of 64 barleycorns.

Nevertheless, in this chapter 16 he speaks alternately about Maimonides' *dirham* of 61 barleycorns and the current (Palestinian?) *dirham* of 64 barleycorns, without appearing to be in any way troubled by these contradictory quantities.

15 In the commentary on the Torah by R. Abraham, Maimonides' son, edited and translated by the late Rabbi Professor Ernest Wiesenberg (London, 1958), it comments on Ex. 39:26, that the *gera* is one *maah* (of 16 barleycorns), and is a quarter of an Arabian *dirham*. The editor notes that this is an approximation, because R. Abraham writes in his responsa that one *dirham* is 64 corns of wheat representing $(25/24) \times 64 = 66 \frac{2}{3}$ barleycorns: this is almost the gaonic *dirham* of 0.7 *dinar*, i.e. 67.2 barleycorns. R. Wiesenberg writes that he finds no source for R. Abraham's statements, which are certainly in contradiction with those of his father.

16 The equation $86 \frac{2}{3} \text{ sela} = 520 \text{ dirham}$ is the origin of the ratio: 1 *sela* = 6 *dirham* or 1.5 *dirham* = 1 *dinar* and, finally, 1 *dirham* = 64 barleycorns. This equation was accepted by R. Joseph Caro in *Kesef Mishneh* on Hilkhhot Bikkurim VI: 15 and on Hilkhhot Kelei ha-Miqdash III: 3 and in Shulhan Arukh Yoreh Deah 294, 6: 1 and 305, 1: 5.

17 R. Hai Gaon accounts for the measurement by R. Hilai Gaon of the weight of the water volume of one egg. The volume of water displaced by one egg was 16.66 Babylonian *dirham*. Therefore, the weight of one *revi'it* water is 25 Babylonian *dirham* = $(7/10) \times 25 = 17.5$ *dinar*.

See Benish, *Midot ve-Shiurei Torah*, p. 216. See Weiss, *Midot u-Mishkalot shel Tora*, p. 85. The ratio: 1 *dirham* = $7/10$ *dinar* is already mentioned in Rashi, B. Bekhorot 49b, bottom.

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coin or a quantity of fine silver. He doesn't speak of the necessity of an effigy.

The Egyptian *dirham*, which is part of his metrical system, weighs 61 barleycorns or 2.70 gr.

The weight of the *revi'it* water has been increased from 17.16 *dinar* in his Commentary on the Mishnah to about 17.5 *dinar*, or 74.375 gr in his *Hibbur*.

2. RASHI AND THE GERMAN TRADITION OF THE *SHEKEL*.

The System of Weight of Köln

The system of weight of Köln was widely known and used in Germany. This system remained in use in Germany until 1838, when it was replaced by the metrical system. In parallel, the same system or at least a very similar system was in use in England under the name of the Tower System of Weight until 1527, when it was suppressed by King Henry.

We have two testimonies to the value of the ounce of Köln, and one testimony to the value of the Tower ounce. According to the 1838 German rule of transition to the metrical system, one mark of eight ounces weighed 233.855 gr. This gives an ounce of Köln of 29.23 gr. According to the Pegolotti's notes,¹⁸ the ounces of Köln and London were equal and weighed 29.24 gr. According to the law of October 1527, the Tower pound was replaced by the Troy pound according to the following rule: 11.25 Troy ounces are equal to 12 Tower ounces. Hence, 1 Tower ounce = $11.25/12$ Troy ounce = 29.16 gr.

Therefore, we can conclude that the Köln and the Tower standards were very similar and virtually equal.

The Köln Standard:

1 pound = 12 ounces = 20 shillings = 350.7825 gr

1 mark = 8 ounces = 233.855 gr

1 ounce = 20 *esterling* = 29.23 gr

1 *esterling* = 1 penny = 1 *pfennig* = 1.46 gr

1 shilling = 12 *esterling* = 17.54 gr

1 pound = 12 ounces = 20 shillings = 240 *esterling*

¹⁸ Francesco Balducci Pegolotti, *Practica della Mercatura* (Cambridge, MA, 1936).

See also Jacob Gershon Weiss, *Midot u-Mishkalot Shel Torah*, p. 110.

German Rabbinical Standard:

1 penny = 1 *pfennig* = 1 *esterling* = 1 פשיט = 1 איסטרליניש

1 shilling = 1 דינר

1 ounce = 1 אוקיא

1 mark = 1 זקוק

1 pound = 1 *pfund* = 1 זקוק = 1 מנה = 1 ליטרא

Until the twelfth century, we find that the *zakuk* was worth 12 ounces, afterwards we find the *zakuk* at 8 ounces, and finally it will be only six ounces.

Rashi and the *Shekel*:

Ex. 21:32: והשקל משקלו ארבעה זהובים שהם חצי אונקיא למשקל הישר של קולוני"א

Ex. 25:39: והמנה הוא ליטרא ששוקלין בה כסף למשקל קולוני"א והם מאה זהובים, עשרים וחמישה סלעים, והסלא ארבעה זהובים.

B. Bekhorot 49b: דהסלא ר' זהובים והזוז במשקל זהוב של משקל שני פשיטין ומחצה למשקל הברזל.

B. Bava Kama 36b: הסלא ד' דינר והדינר משקלו זהב וכן קורין בקושטנטינ"א לזהב דינר והוא שנים ומחצה למשקל הברזל.

The references above, except for the second one, state that the *sela* weighs a half of the ounce of Köln of the standard of the Right Weight of Köln, or four golden coins of 2.5 *esterling* each, according to the standard of the Weight of iron of Köln. This must represent the half of 29.23 gr or 14.61 gr. It is also the weight of 10 *esterling* of 1.46 gr each, or the weight of four German golden coins of 3.65 gr (at least their theoretical weight).

In the second reference, Rashi writes that the *mana* or hundred *dinar*, i.e. twenty-five *shekel*, has the same weight as a pound of the standard of Köln, which corresponds to the weight of ninety-six golden coins of Köln. According to this last statement, one *mana* weighs one *litra* or one pound of the standard of Köln with which one weighs silver. This pound has the same weight as 240 *esterling*; i.e. it weighs $240 \times 1.46 = 350.78$ gr. It corresponds also to 96×2.5 *esterling*, i.e. to the weight of 96 golden coins of 2.5 *esterling*. We see then that:

$1 \text{ mana} = 25 \text{ shekel} = 100 \text{ dinar} = 240 \text{ esterling} = 96 \text{ German golden coins weighing } 2.5 \text{ esterling}.$

As a result, $1 \text{ dinar} = 2.40 \text{ esterling} = 0.96 \text{ golden coin of } 2.5 \text{ esterling}.$

We have then two possibilities of interpretation:

1. The ratio in weight:

$$1 \text{ dinar} = 2.5 \text{ esterling} = 1 \text{ German golden coin} = 3.65 \text{ gr} \quad (2)$$

is a rough estimation and the accurate ratio is in fact:

$$1 \text{ dinar} = 2.4 \text{ esterling} = 0.96 \text{ golden coin of } 2.5 \text{ esterling} = 0.96 \times 3.65 = 3.50 \text{ gr.} \quad (3)$$

2. Both ratios are rigorous but refer to two different standards:

1 *dinar* = 2.5 *esterling* of the iron market.

1 *dinar* = 2.4 *esterling* of the silver market.

The standard of the silver market is higher than the standard of the iron market by the ratio 100/96 or 25/24.

This second position has been championed by Jacob Weiss¹⁹ and, before him, R. Hayim Jacob Sheftiel²⁰ discussed it, though it was criticized by Samuel Zeev Reich.²¹ The following passage in *Mahzor Vitry* is not clear and could, at the first glance, be understood according to the second assumption of the existence of two standards.

Nevertheless, there is no mention of the existence of two standards in Köln; we have knowledge of only one standard of Köln for precious metals, which was maintained through the Middle Ages until modern times. Furthermore, we have additional evidence that rabbinical authorities used the ratio (3), and referred explicitly to the standard of the iron market. It appears then that there was only one standard in Köln. Let us examine some evidence from other German authorities.

There is only one Standard of Weight in Köln

We examine different quotations by German authorities.

Mahzor Vitry:²²

והמנה שלנו הוא מנה של צורי, והוא ליטרא ששוקלים בה כסף למשקל ישר של קולוניא.
והיא כ"ה סלעים שהוא ק זהובים שקורין קושטנטינין, שכל זהוב שוקל שנים פשיטים

19 *Midot u-Mishkalot shel Torah*.

20 R. Haym Sheftiel, *Erekh Milin* (Berditchev, 1907 and Tel Aviv, 1969), entry "sela."

21 Samuel Ze'ev Reich, *Messorat ha-Shekel* (Toronto, 1988).

22 *Makhzor Vitry* (Nuremberg, 1923), Vol 1, p. 44.

ומחצה למשקל הברזל. נמצא שהמנה שוקל כ"ה דינרים למשקל הברזל, וזו היא ליטרא
פילפלין שלנו. [In this text, ק should be corrected by צ"ו and, at the end of the
quotation, ה"ה by כ"ה.²³]

Our *mana* – the Talmudic *mana* – is the Tyrian *mana*. It corresponds to the weight of the pound used for weighing silver according to the Right Weight of Köln. And it contains 25 *sela* (or 100 *dinar*) of the same weight as ninety-six²⁴ modern golden coins, which are called coins of Constantinople,²⁵ each of them weighing 2.5 *esterling* according to the Iron Weight of Köln. Finally, the conclusion is that the *mana* weighs twenty shillings (or one pound) according to the Iron Weight and this is also the weight of our pound for weighing pepper.

This text presents much similarity with the commentary of Rashi on Ex. 25:25. It is much older than most of the texts listed below, and is already mentioned by Reich as evidence that there was only one standard of weight in Köln. Unfortunately, this passage needs two corrections to become intelligible. These corrections are nevertheless evident and indisputable. According to this text, the pound used for weighing silver had the same weight as 20 shillings of the Iron Weight and, therefore, there is only one standard of weight in Köln. I suppose that there were in Köln two official weighing institutions, the first the *mishkal ha-yashar* for the precious metals and the second the *mishkal ha-barzel* for the other metals. But both institutions worked according to the same standard of Köln. Therefore, the Talmudic *mana* is equivalent to the *litra* (pound) of the *mishkal ha-yashar*, but it is also equivalent to twenty shillings of the *mishkal ha-barzel*. It seems thus that there was only one standard.

23 Until recently I thought that this proof as well the two corrections of the text had not been proposed before. I have in the meantime discovered that R. P. Benish has already mentioned this text and the two corrections in his book *Midot ve-Shiurei Torah*, p. 468 n. 56.

24 One can object: why 96 and not 100 according to Rashi's commentary on Ex. 25:29, where it is explicitly written: one hundred golden coins. If it was 100 then we would have in Köln two different systems, the *mishkal ha-yashar* and the *mishkal ha-barzel*.

In the *mishkal ha-yashar*: 1 *mana* = 1 pound = 240 *esterling* of *mishkal ha-yashar*.

In the *mishkal ha-barzel*: 1 *mana* = 100 *zehuvim* = 250 *esterling* of *mishkal ha-barzel* = 1.04 pounds of *mishkal ha-barzel* = 20.883 shillings of *mishkal ha-barzel*.

This is in contradiction with the end of the quotation from *Makhzor Vitry*, which states that the *mana* is 20 shillings of the *mishkal ha-barzel* and also one pound used for weighing pepper.

In other words, it is because of this last paragraph that we can correct the 100, and replace it by 96, as in the text of Rashi.

25 Rashi expresses himself slightly differently in B. Bava Kama 36b כסף צורי ב"ד.

J. Jean Ajdler

The golden coin of Köln weighs 2.5 *esterling* or $2.5 \times 1.46 \text{ gr} = 3.65 \text{ gr}$

The Talmudic *mana* weighs 96 golden coins or $96 \times 2.5 = 240 \text{ esterling} = 350.78 \text{ gr}$

The *dinar* weighs 0.96 golden coin = 3.5 gr, slightly less than the golden coin

The *sela* weighs $0.96 \times 4 = 3.84$ golden coins ~ 4 golden coins.

Sefer Ravia of R. Eliezer ben Joel ha-Levi (1140-1225):²⁶

ובפירוש רבי' אליקים ראיתי בפ' מי שמת דהדינר של כסף שקל ב' פשיטין ומחצה למשקל הברזל. וגם רבי' שלמה פי' כן בבכורות פ' יש בכור לנחלה, גבי חמש סלעים של פדיון הבן. ובתשובות הגאונים כתב שדינר כסף משקלו זהוב רומנט וכן קוראין בקושטנטינא לזהוב דינר, הוא שנים ומחצה למשקל הברזל ופחות מעט, שמאה מהן דהיינו מנה שוקלים ליטרא פשיטין – למשקל הברזל, וזה יבא י' פשיטין פחות-.

The last sentence of the quotation does not belong to the principal text of Ravia, but it is an interesting reading of one of the extant manuscripts. We see here that Ravia explicitly refers to the Iron Weighing, but he adds that the weight of the Talmudic *dinar* is a little less than 2.5 *esterling* because one hundred Talmudic *dinar*, or one Talmudic *mana*, weigh one *litra* of *esterling* (weight), i.e. 240 *esterling* of 1.46 gr. Thus, the Talmudic *dinar* weighs 2.40 *esterling* and not 2.50 *esterling*, i.e. 3.50 gr and not 3.65 gr.

R. Hezekiah ben Manoah in Hizkuni²⁷ (mid-thirteenth century):

In his commentary on Ex. 25:29, he quotes Rashi's Commentary and adds:

הרי שבמנורה היו חמישים ליטרין זהובים למנין העולם שנותנין מאתים וארבעים פשוטין בליטרא,

According to Rashi, in the above commented text, 120 Talmudic *mana* weigh 120 pounds of 350.7825 gr or 42093.90 gr. Now we know (see below R. Gershom) that the golden coins of a theoretical weight of 3.65 gr weighed in fact about 3.50 gr. Thus, the 120 Talmudic *mana* weighing 42093.90 gr represent 12.026.83 golden coins, or 50.11×240 golden coins, or, finally, 50.11 *litra* of *zehuvim*, which he rounded off to fifty *litra* of *zehuvim*.

26 *Sefer Ravia* (Jerusalem: Makhon Harry Fishel, 1965), Vol. 4, pp. 299-300. This reference, like the two that follow, was already mentioned by Reich.

27 Hizkuni (Venice, 1524 and Cremona, 1559).

Rosh or R. Asher ben Yehiel (~1250-1327):²⁸

פ' רש"י היוצא במדינת צור, ושיעור של אותו מנה כ"ה סלעים והסלע ד' זוזים והזוז במשקל הזהב של משקל ב' פשיטין ומחצה למשקל הברזל. וכן פירש בפ"י החומש בפרשת ואלה המשפטים גבי שלושים שקלים דהשקל משקלו ד' זהובים שהן חצי אוקי' למשקל הישר הקולוני"א, ונראה שקיבל דבר זה מרבנותיו.

It seems quite clear, therefore, that the Rosh did not make any difference between the Iron Weighing of Köln and the Right Weighing of Köln.

Sefer Agudah of R. Alexander ha-Kohen (died as a martyr in 1349):²⁹

מצאתי בתו' בשם רבי' תם דמנה הוא זקוק כסף, נמצא חמש סלעים חמישית של מנה והוא חמישית של זקוק כסף. וכתובת בתולה היא ב' זקוק כסף.

The *zakuk* was originally 12 ounces or one *litra*, i.e. one pound. This quotation is thus parallel to Rashi's commentary on Ex. 25:39: one Talmudic *mana* or 100 Talmudic *dinar* weigh one pound or 240 *esterling*. Thus, one Talmudic *dinar* weighs 2.40 *esterling*, i.e. 3.50 gr. The five *sela* of the redeeming of the firstborn weigh 20 x 2.4 *esterling* = 48 *esterling* or 0.2 pound = 0.2 *zakuk* and the *ketuba* of 50 *sela* weighs two pounds or two *zakuk*.

R. Jacob Weil (first half of the fifteenth century):³⁰

חמש סלעים הוא ה' לוט, והוא נגד ב' אונקיות וחצי כסף צרוף מעט פחות.

Thus, R. Jacob Weill still refers to the Iron Weighing of Köln, and writes that the five *sela* for the redeeming of the firstborn weigh five *lot* or two and a half ounces according to the Iron Weighing of Köln -- in fact, a little less, he says.

The five *sela* weigh: $5 \times 4 \times 3.50 \text{ gr} = 70 \text{ gr}$

And 2.5 ounces weigh: $2.5 \times 29.23 \text{ gr} = 73.075 \text{ gr}$

But 2.4 ounces weigh: $2.4 \times 29.23 \text{ gr} = 70.15 \text{ gr}$.

Hence, "a little less" means only 2.4 ounces of silver. Indeed, the Talmudic *dinar* weighs exactly 2.4 *esterling* and the 5 *sela* weigh $20 \times 2.4 \text{ esterling} = 48 \text{ esterling} = 48/20 = 2.40$ ounces.

28 On B. Bekhorot, chapter VIII.

29 R. Alexander Susslin ha-Kohen of Frankfurt, *Sefer Agudah* (Jerusalem, 1994), Bekhorot, p. 90. He lived during the first half of the fourteenth century and died a martyr's death in Erfurt.

30 Rabbi Yakov Weil, *She'elot U Teshuvot*, responsum 189 (Jerusalem, 1987/8 and 2000/1).

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R. Gershom ben Judah, Meor ha-Golah (~ 960-1028):
Before Rashi, R. Gershom wrote already in B. Bekhorot 49b:

דינר זהב הוי ה' פשוט למשקל הברזל, דינר כסף ב' ומחצה למשקל הברזל...

But he wrote in B. Hulin 84b:

והמנה הוא ליטרא וחצי אונקיה.

This equation is surprising. Normally, 1 *mana* = 240 *esterling* = 1 *litra* = 350.78 gr.

The only explanation is that the *litra* means here 240 *esterling* coins.

This *litra* = 240 *esterling* coins = 240 x 1.4 = 336 gr = 11.5 ounces.

1 *mana* = 240 *esterling* coins + 10 *esterling* coins = 250 *esterling* coins = 250 x 1.4 = 350 gr.

The *esterling* coin weighs thus 1.40 gr instead of 1.46 gr.

Back to Rashi on the Torah

There remains a conundrum in Rashi's exegesis on the Torah. Rashi knows³¹ that the *shekel* of the Torah has been revalued by 20 percent to become the Talmudic *sela*. Why does he give twice the weight of the Talmudic *sela* in his commentary on the Torah, where he should give the weight of the Torah *shekel* in order to describe the weight of the Menorah. Indeed, his *shekel* in the Torah is the same as that described in his commentary on B. Bekhorot and on B. Bava Kama. As it appears from the quotation above of the Rosh, and from the discussion of Rashi's commentary by Nahmanides, these Rabbis also understood that he was referring to the Talmudic *sela*. The Rosh also compares the weight given in the Torah to that given in the Talmud. But no one has objected to this anachronism.

The *Zakuk*

We mentioned above a quotation from *Sefer Agudah*, quoting a tradition of R. Tam that the Talmudic *mana* is a *zakuk*. At the time of R. Tam, the *zakuk* weighed 12 ounces or 350.78 gr. This can be proved through a quotation from *Sefer ha-Pardes*:³²

אמר 'שלמה בשם הר' ר' גרשום זצ"ל שאסור לנהוג כדרך שנוהגין במלכות זה שנותן ליריד של קולוני"א זקוק של כסף שהוא י"ב אונקיות ומקבלים למזונם במגנצא או לוורמישא כשהורין י"ג אונקיות פשיטין.

³¹ He has recalled it in his commentary on Ex. 30:13.

³² *Sefer ha-Pardes*, § 269.

The *zakuk* is defined here as twelve ounces. But the normal meaning of the *zakuk* is the mark of eight ounces. For example, in *Kaftor va-Ferah*, chapter XVI, it mentions explicitly that the *zakuk* is 8 ounces.³³

In the fifteenth century, we find the *zakuk* with the meaning of 6 ounces. For example, in *Terumat ha-Deshen*, Vol. 2, no. 232, we read that “in the area of the Rhine they write in the *ketuba* of the virgin 100 *litra*, which are 100 *zakuk*, while in Regensburg they write 100 pounds of the Iron Weighing standard which are 200 *zakuk* of silver.” The end of the quotation undoubtedly means that one *zakuk* is a half pound or six ounces of the Iron Weighing standard; the beginning of the quotation means then that one *litra* of coins or 240 small silver coins of the time weighed one *zakuk* or six ounces, i.e. 175.38 gr. We see how much the silver coins had been devalued with regard to the standard of the eleventh-twelfth centuries – they had been reduced by half. The *ketuba* was thus 17.54 kg silver in the area of the Rhine, while it was 35.08 kg silver in Regensburg.

3. ABOUT THE ALLEGED UNDERVALUATION OF THE *SHEKEL* BY R. TAM

In the rabbinic literature we find a strange tradition assigning to R. Tam an abnormally light weight for the *sela*. This erroneous tradition can already be found at the beginning of the fourteenth century.

The Commentary *Minhat Yehudah*:³⁴

In this commentary on Ex. 21:32, it refers to our printed *Tosafot*³⁵ and follows them. Like *Tosafot*, it reproaches Rashi for an alleged mistake, according to which the Talmudic golden *dinar* and the Talmudic silver *dinar* would have the same weight of 2.5 *esterling*. In fact, they misunderstood Rashi and wanted to understand that the Talmudic silver *dinar* had the same weight as the Talmudic golden *dinar*, which weighed 2.5 *esterling* of the Iron Weighing standard.³⁶ In *Minhat Yehudah*,

33 See *Kaftor va-Ferah* (1997), Vol. 1, p. 222.

34 By R. Judah ben Eliezer (thirteenth and fourteenth centuries). The commentary would have been completed in 1313 CE. This commentary, together with the Commentary of the *Tosafot*, is the first super-commentary on Rashi on the Torah. This commentary was edited by R. Jacob Nunez Weiss in Livorno in 1783. It was reprinted in Ofen in 1834, and then in Israel in 1967.

35 On B. Bekhorot 49b, beginning with: אמר רבי אסי.

36 In fact, Rashi never mentioned the golden *dinar* but only the modern German golden coin weighing 2.5 *esterling*, which had the same weight as the Talmudic silver *dinar*.

it makes a second mistake: instead of equating the weight of the Talmudic silver *dinar* to 2.5 *esterling*³⁷ and the golden *dinar* to 5 *esterling* as it should be,³⁸ it attributes to R. Tam the fact that the Talmudic golden *dinar* weighs 2.5 *esterling* and the Talmudic silver *dinar* weighs only 1.25 *dinar*; in fact, half of the true weights. It may be noted that the text of the referred *Tosafot* does not support such a conclusion. The *Minhat Yehudah* concludes the discussion by the following summary:

The five *shekalim* of the redeeming of the firstborn are:
sixty *esterling* according to R. Eliahu of London (according to *geonim*: *sela* of 17 gr or 12 *esterling*);
fifty *esterling* according to Rashi (*sela* of 14 gr or 10 *esterling*);
twenty-five *esterling* according to R. Tam (*sela* of 7 gr or 5 *esterling*).

The *Kaftor va-Ferah*:

In *Kaftor va-Ferah*, R. Estori ha-Parhi writes that according to R. Tam the golden *dinar* weighs 2.5 *esterling* and the silver *dinar* weighs 1.25 *esterling*.³⁹ It appears that these considerations are completely parallel to the conclusions of the *Minhat Yehudah*.

***Sefer Agudah*:**

We have already given above a quotation⁴⁰ from *Sefer Agudah* in the name of R. Tam, according to which the *mana* is a *zakuk*. In the time of R. Tam, the *zakuk* was indeed 12 ounces. Another quotation from *Sefer Agudah* in *Hilkhot Ketubot*⁴¹ ascertains that, according to the thesis of R. Tam, the Talmudic *mana* is a *zakuk* and two hundred *zuz* are two *zakuk*, so that when one gives to a virgin ten *zehuvim* or to a widow five *zehuvim*, one hasn't given less than the Torah obligation.

In other words, ten *zehuvim* from the beginning of the fifteenth century are about two hundred Talmudic *zuz*. This statement is based on the data existing at the time of the author of *Sefer Agudah* at the beginning of the fifteenth century. We must then consider:

37 As Rashi stated: the Talmudic silver *dinar* had the same weight as a modern golden coin that weighed 2.5 *esterling*, or about 3.5 gr.

38 Which they should have known from the commentary of R. Gershom on B. Bekhorot 49b.

39 See *Kaftor va-Ferah* (1997), Vol. 2, p. 237.

40 Bekhorot p. 90.

41 *Hilkhot Ketubot*, chapter V, No. 75.

First, the *zakuk* was a mark weighing eight ounces or 233.84 gr and, second, it seems, according to Weiss, that the *zehuv* of the *Agudah* weighed about 3.5 gr.⁴²

If k is the coefficient of equivalence between gold and silver then:

$2 \text{ zakuk} = 467.68 \text{ gr} = 10 \times 3.5 \times k$ and k is 13.36, which a very likely value for this period.

We can therefore deduce the weight of the *zuz* according to R. Tam:

$1 \text{ zuz} = 467.68 / 200 = 2.34 \text{ gr}$ and $1 \text{ sela} = 9.35 \text{ gr}$, i.e. $2/3$ of the value according to Rashi. This opinion is mentioned in the responsa of Maharil⁴³ and in the glosses of Rema on Shulhan Arukh Yoreh Deah 66.⁴⁴

Conclusion:

There is a fundamental difference between the first two opinions and the third. The first two opinions attribute to the Talmudic silver *dinar* half of its real weight on the basis of an incorrect understanding of the words of Rashi by R. Tam,⁴⁵ and an incorrect understanding of R. Tam by *Minhat Yehudah*.⁴⁶ The third opinion is based on an incorrect understanding of the opinion of R. Tam, although correctly reported by the *Agudah*, because of the change in value of the *zakuk* used by the German Jews, decreasing from twelve ounces to eight ounces without the Rabbis – especially the *Agudah* himself and later the Maharil and Rema – remembering it.

4. NAHMANIDES AND THE SHEKEL

In his *Hilkhot Bekhorot*, Ramban writes that the *sela* weighs twelve “arigenz,” i.e. twelve *orienço*. The *orienço* had the same weight as the *esterling*. Now, there are two *esterling*: the *esterling* weight of about 1.46 gr, and the *esterling* coin of about 1.41 gr. It is likely that in Spain they referred to the *orienço* coin of about 1.40-1.41 gr, which is compatible with a *sela* of about 17 gr corresponding to four

42 See Weiss, *Midot u-Mishkalot shel Tora*, chapter 48, p. 124.

43 Responsum 76.

44 See *Erekh Milin*, p. 55, entry “zakuk,” where it discusses whether the *zakuk* of *Agudah* corresponds to eight or twelve ounces. In fact, the comparison of the two quotations from *Agudah* leaves no doubt on the matter: the *Agudah* considers a *zakuk* of eight ounces and Maharil understands the same.

45 Rashi ascertains that the Talmudic silver *dinar* has the same weight as the modern golden coin in use in Köln in his time, which weighs about 2.5 *esterling*. R. Tam understands that Rashi equalizes the weight of the Talmudic silver and golden *dinar*.

46 He ascertains that R. Tam established the weight of the Talmudic golden *dinar* at 2.5 *esterling*, and the weight of the Talmudic silver *dinar* to 1.25 *esterling*.

Arabic golden *dinar*. The weight of the *orienço* and the *esterling* was therefore considered by the Rabbis to be equal to $384 / 12 = 32$ barleycorns or 8 *kirt*.

Ramban in his Commentary on the Torah:

In his commentary on Ex. 30:14, Ramban expounds Rashi's point of view and agrees with it, especially on the point where Rashi equalizes the *shekel* of the Torah with the Talmudic *sela*, without taking any exception to the omission of the problem of the revaluation – although he does say that Rashi forgot one point: “The kings of the nation reduced the weight of the golden coins. The fourth part of the *shekel* is in fact the *dinar* ‘shesh dang’ of 4.24-4.25 gr or 3 *orienço*, but it is heavier by about 1/3 than our golden coins.”⁴⁷

Thus, “Rashi confused the *dinar* ‘shesh dang’ with the modern gold coins of his (and also our) time. In fact the *shekel* is 3/4 of an ounce according to the weighing system of this country (Spain) and it is certainly the ounce of Rashi,” he says. The ounce to which Nahmanides is referring is the ounce of mark currently used in Spain and weighing about 23.3 gr, i.e. 16 *orienço* or 16 *esterling*.⁴⁸ The *shekel* is then 3/4 of this ounce and weighs 12 *esterling*, and the Talmudic *dinar* then weighs 3 *esterling*.⁴⁹ By contrast, according to Nahmanides, Rashi thought that the *shekel*

47 The Arabic *dinar* weighs 4.25 gr, i.e. 3 *esterling*. Apparently, Nahmanides means that the new and diminished golden coins weigh 2 *esterling*, i.e. about 2.83 gr, and therefore that the *shekel* of Rashi weighs four such coins or 8 *esterling*. Nahmanides writes further “about 1/3” so that it is difficult to know exactly to which golden coin he is referring. Probably because of this difficulty of exegesis, R. J.G. Weiss has proposed explaining this passage differently (see his book *Midot u-Mishkalot shel Torah*, p. 115, and note 115). According to him, Nahmanides considers that Rashi had a *shekel* of 10 *esterling* according to the truth, and his golden coin weighed 2.5 *esterling*, but he estimates the weight of the *shekel* according to the *geonim* as 15 *esterling*. This allows him to explain that the *dinar* is 50 percent heavier than the modern golden coins (1/3 external). However, this explanation seems farfetched and incorrect. It would imply that Ramban understood Rashi correctly, but erred in his understanding of the *geonim*. Nevertheless, in his halakhot on B. Bekhorot, which he wrote before leaving Spain, he understands the *geonim* correctly. Furthermore, from his letter sent from Acre, we see clearly that it is Rashi whom he misunderstood, therefore ascribing to Rashi an incorrect ounce.

48 The *esterling* corresponding to this ounce weighs about 1.46 gr. This would give a *dinar* of $3 \times 1.46 = 4.38$ gr, and a *shekel* of 17.52 gr. It is likely that the ratio 1 *shekel* = 0.75 Spanish ounce is approximate, and must be considered with the *esterling* coins of about 1.41 gr, giving a Talmudic *dinar* of about 4.24-4.25 gr, equal to the bizant sarrazin of Acre of the same weight.

49 Similarly, R. Solomon ben Aderet wrote in responsum 1011 that the Talmudic *dinar* weighing 96 barleycorns is three *arigenz* or three *esterling* of Barcelona, weighing 32 barleycorns. It

was half of this ounce and weighed 8 *esterling*.⁵⁰ Therefore, according to Nahmanides, Rashi's golden coins must weigh two *esterling*.⁵¹

Ramban in his Halakhot on Bekhorot:

He writes clearly that the *shekel* weighs twelve "arigenz of this country."

Ramban in his letter sent from Acre:⁵²

Ramban writes about the *shekel* that he saw in Acre:

It weighs 10 *esterling* and this is certainly the half of the ounce that Rashi had mentioned.⁵³

The Talmudic *dinar* weighs 96 barleycorns corresponding to the bizant sarrazin, it weighs 3 *esterling* and therefore the *shekel* weighs twelve *esterling* according to the *geonim*. But this is not true; the *shekel* is only 10 *esterling* as Rashi. We can deduce from it that in fact the Arabic kings increased the true Talmudic *dinar* by 1/6 (external) and established their Arabic *dinar* to 4.25 gr, representing about 6/5 of the Talmudic *dinar*.

5. R. ESTORI HA-PARHI AND THE *SHEKEL*⁵⁴

R. Estori ha-Parhi has provided interesting data about the weight of different currencies of his time. But these data must be examined carefully because of corrupted readings, likely missing fragments, and imprecision of the author.

As mentioned above, he considers that the *dirham* of Maimonides weighs 61

is likely that he refers to the *esterling* coin of about 1.41 gr, and not to the *esterling* weight of about 1.46 gr.

50 The *sela* of Ramban weighs 12 *esterling* and, according to him, the *sela* of Rashi weighs 8 *esterling*. This corresponds with his introductory statement that the kings devalued the golden coins by 1/3.

51 The Talmudic silver *dinar* has the same weight as the modern golden coin of his time.

52 For a complete text of the letter see Rabbi Tsvi Hirsh Eisenstadt, "The Letter About the Coin 'Shekel Israel' and its Weight" (Yeshiva University, 1958), *Talpiot*, IV, 3-4; *Peirush ha-Ramban al ha-Torah*, ed. Shavel (Mossad ha-Rav Kook); *Ramban al ha-Torah, Tuv Yerushalayim*, ed. Lieberman (Jerusalem, 1997).

53 "and that I had rejected."

54 R. Estori ha-Parhi (1280 ~1355). French Rabbi born in northern France (Tours, hence his name Ish Tori) or in Provence, but from parents whose origins were in Tours; he studied under R. Jacob ben Makhir. In 1306, when the Jews were expelled from France, he escaped to Spain and learned under R. Asher ben Yehiel. He was in Cairo in 1313; afterwards he remained in Israel. He completed his famous book in 1322.

barleycorns and doesn't mention the reference from the *Hibbur*, which, according to our reading, corresponds to 64 barleycorns. He mentions that, in his time, the *dirham* weighs 54 barleycorns, and he performs all his calculations on this basis.

On the basis of a *sela* of 384 barleycorns weighing four Arabic golden *dinar*, the *sela* or Talmudic *shekel* weighs 17 gr and six *dirham*, each of them weighing 2.83 gr. He writes that one *zakuk* is worth fifty *tournois*,⁵⁵ but we know that the *tournois* was struck at the rate of 58 *tournois* per mark. The French mark weighed 244.75 gr and the French ounce weighed 30.59 gr. The *tournois* legally weighed $244.75 / 58 = 4.219$ gr. In fact, the *tournois* weighed on average 3.95 gr, and was thus struck practically at 62 per mark. Thus, with one mark the authority was striking 62 coins, but the mark of fine silver could be bought for 50 *tournois*. The *tournois* thus had a premium of about $12/50$ or 24 percent. In fact, the fineness of the *tournois*, according to *Kaftor va-Ferah*, was $23/24$, so that the premium was even greater: $(24/23) \times 24$ percent = 25 percent.

He writes further⁵⁶ that one *tournois* is certainly worth two *dirham*. The fineness of the *dirham* is $2/3$. In two *dirham* we have: $2.83 \times (2/3) \times 2 = 3.77$ gr of fine silver and $3.77 \text{ gr} \times (24/23) = 3.94$ gr. This confirms that, for practical purposes, the *tournois* weighed, on average, 3.95 gr. This relationship was probably true in Palestine, where the *tournois* was considered according to its fine silver content. It was probably only in France that the *tournois* had such an important premium. Other currency, like the *esterling*, was indeed forbidden in France and the *esterling* was a denomination used only for calculation.

Estori ha-Parhi studies carefully the weight and the value of the *shekel* according to the different rabbinic authorities.

Rashi in his Commentary on the Torah

We find the following relationships:

1 *shekel* = 0.5 ounce of Köln

1 mark = 8 ounces = 50 *tournois*

1 ounce = 6.25 *tournois*

1 *shekel* = $1/16$ mark = 3.125 *tournois*

1 *mana* = 78.125 *tournois*

5 *shekel* = 15.625 *tournois*.

55 This is the "gros tournois"; it weighed theoretically 4.219 gr. It was divided into 12 "petit tournois" of 0.351 gr.

56 Vol. 1, p. 283.

The following remarks must be made:

The French mark is heavier than the mark of Köln.

The ounce of Köln weighs 29.23 gr, while the French mark weighs 30.59 gr.

The ratio 1 mark = 50 *tournois*, is a ratio in value, of significance only in France where the *tournois* was at a premium.

Thus, the relationship 1 *shekel* = 3.125 *tournois* is a ratio in value applicable only in France.

To get a correct ratio in weight, we must correct:

$$1 \text{ shekel} = 3.125 \times (62/50) \times (29.23/30.59) = 14.62 \text{ gr.}$$

Rashi in the *Gemara*

The author is persuaded that the first calculation above refers to the *shekel* of the Torah, i.e. 3.33 *dinar*. He seems to ignore the fact that Rashi gives the same weight for the *sela* in his Commentary on the Torah and his commentary on the Talmud. In fact, he attributes to Rashi the theory of Maimonides, but works with a *dirham* of 64 barleycorns. The *sela* weighs 384 barleycorns or six *dirham*; five *sela* weigh thirty *dirham* but they are worth 45 *dirham*.⁵⁷

R. Jacob Gaon

This is exactly the gloss in the text of B. Bekhorot: the five *sela* weigh 28.5833 *dirham*. *Kaftor va-Ferah* doesn't know that the Babylonian *dirham* (0.7 *dinar*) is heavier than the current *dirham*.

Ittur (R. Isaac ben Abba Mari of Marseilles, 12th Century)

Two hundred *dinar* of the Torah weigh 40.5 ounces.

One *shekel* of the Torah weighs 0.81 ounce or $0.81 \times 30.59 = 24.77$ gr.

R. Jona Ibn Janah

One *shekel* of the Torah = 3.33 Talmudic *dinar* = 3.33 Arabic *dinar*.

But the modern Arabic *dinar* weighs 92 barleycorns while the *dinar* of Tyre weighs 96 barleycorns.

⁵⁷ Because the fineness of the *dirham* is 2/3.

J. Jean Ajdler

Rosh (R. Asher ben Jehiel)

Five *sela* = 27 *tournois*.

It is probably a ratio in weight because in Spain the *tournois* has lost its premium.

One *sela* = 5.4 *tournois* = 5.3 x 3.95 = 24.88 gr.

Estori ha-Parhi doesn't give any reference about the data that he ascribes to the former authorities. Furthermore, we see, according to his description of the coinage of Rashi that we know relatively well, that we must accept his data with much caution.

6. CONCLUSION

The different denominations cannot always be easily categorized and this is particularly difficult when the same denomination⁵⁸ can refer to different weights. We have tried to explain the halakhic coinage of various rabbinic authorities: Maimonides, Rashi, German *rishonim*, Nahmanides and Estori ha-Parhi. We have proposed a probable solution to solve the contradiction between the weight of the Egyptian *dirham* in the Commentary of Maimonides on the Mishnah and his *Hibbur*.

We have seen that the German Rabbis had a surprisingly accurate knowledge of the Talmudic coinage.

58 For example the *zakuk*.