

# Weight variations in *Lokroi Epizephirioi* bronze coins: reduction of the *standard* or striking “al marco”?

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**Abstract** – This paper proposes some observations on the weights of the Lokrian bronze coinage, so far little studied by researchers.

Through a careful analysis of the series, aided by the sequence of the coinages that I studied recently in a doctoral research in progress, I have observed many cases of degradation of the coins weights of the same issue.

The fact that this oscillation was often observed in coins struck practically contemporaneously from the same pair of dies or from the same obverse die only is not a proof of standard's reduction within the same issue but of a generalization of “al marco” striking, which we have to be taken into account when we define the metrological system of the Lokroi mint and its relation with the tablets of the local sanctuary of Zeus Olympian tables and other Magna Graecia mints.

The coinage of *Lokroi Epizephirioi*, the origin of which is dated around the middle of the IV century, BC has been little studied either in terms of chronology or metrology [1]. Epigraphic sources such as the tablets of the local Sanctuary of Zeus Olympian [2] show how this city, like other Doric cities (Syracuse and Tarentum) adopted the *litra* system, with issue of the multiple of 10, the *nomos* (also found in Aristotle [3]), rather than the drachma divided in 6 obols, weighing less than a gram in silver, as was the *litrae*.

In fact, from the information gathered from the tablets various hypotheses have been proposed. If N. Parise has put forward the equivalences between the Lokrian *litra* and that in Syracuse [4], other have argued that the former corresponded to one half of the latter [5]. The interpretation of P. Marchetti [6], however, appears more credible. He claims that the *Lokroi* model in some sense broke away from that of Syracuse, and that the Lokrian *stater* was linked to the Italiot (7.7-7.8 g.), devalued more than once over the years, to arrive at 6.7-6.8 g. in the Pyrrhic age [7].

The existence of two silver coins in *Lokroi* of 0.68 g. [8] and 0.35 g. [9] would confirm this loss of weight and the consequent hypothesis that the Lokrian *litra* was simply one twentieth of the Italiot *stater* [10], which in turn substitutes the Corinthian *stater*s reference point of the system in a similar way to the original equivalence to 20 *litrae* of the Syracusan *nomos* prior to the age of Aristotle [11]. Having said that, the silver *nomos* coined in Magna Grecia as well as in Sicily was generally understood to have begun from the end of the IV century BC, as decalitre and thus it is possible that the pieces we call *stater*s, in that epoch were double and that the half *stater*s coined by numerous mints in the Pyrrhic age, with the type of owl, were actually *nomoi* [12].

The metrological position of the bronze series is rather more complicated; the problem here is the lack of knowledge of these coins and their weight.

The systematic analysis of the coinage in *Lokroi* (gold, silver and bronze) aimed at the building of a *Corpus*, comprising of a quantification and reconstruction of the sequence of dies used, on which I have been working for a number of years [13], has allowed us to measure for the first time the weight of the coins in order to establish a framework for the bronze series [14], and to overcome the problem of the lack of inscribed values by calculating on a consistent number of exemplars and maximum and minimum weights, the medium weight and, above all, the *average* graphically synthesised.

Apart from the recovery of these data, the reconstruction of the die sequence allows us to tackle and overcome certain controversial matters, such as the possible duration of a single issue, which cannot be too lengthy if carried out with a limited number of coins, and to understand whether, from a metrological perspective, the standard of the coins suffered a gradual and progressive reduction (as has long been proposed for the first series of Roman bronze coins [15]), or whether there were not chronological variations.

Given the fact that every coin was realised on two dies, obverse and reverse, that wore out quickly and were thus destined to be substituted, if we examine the weights of the coins coming from the same pair of dies, we can be sure that the observed data relates to coins of the same period.

Effectively even within the same pair of dies we often find that the weights can vary between 1 and 4 grams, in the case of series of which we have numerous examples, but in the rarer series, hence it is quite illogical to think in these terms.

Among the series for which there are numerous examples: 1) anepigraph with Zeus/Eagle (maximum: 16.70 g. [16], medium: 10.04 g., minimum: 5.74 g. [17], *average*: 10.20-10.40 g.; obverse dies: 30, reverse dies: 53), probably Timoleonian, controversial whether it belongs to the Lokrian mint [18].



Fig. 1. Zeus/Eagle

There are three coins belonging to the same couple of dies with evident variations in weight, 10.86 g. [19], or 9.63 g. [20] to 5.74 g. [21], that reach in percentage terms up to 89.19% compared to the lighter coins; 2) series with *Athena/Thunderbolt* of Agatoclean age [22] (maximum: 6.26 g. [23], medium: 4.34 g., minimum: 1.88 g. [24], *average*: 4.80-5.00 g.; obverse dies: 56, reverse dies: 63) in which the two coins weigh respectively 5.21 g. [25] e 4.81 g. [26], with a more normal variation of 8.31% (but also much lighter pieces from other dies).



Fig. 2. Athena/Thunderbolt

A similar situation is found in a series that has today fewer surviving pieces, like the issue with *Athena/Female figure on throne* (maximum: 18.51 g. [27], medium: 13.93 g., minimum: 9.64 g. [28]; *average*:

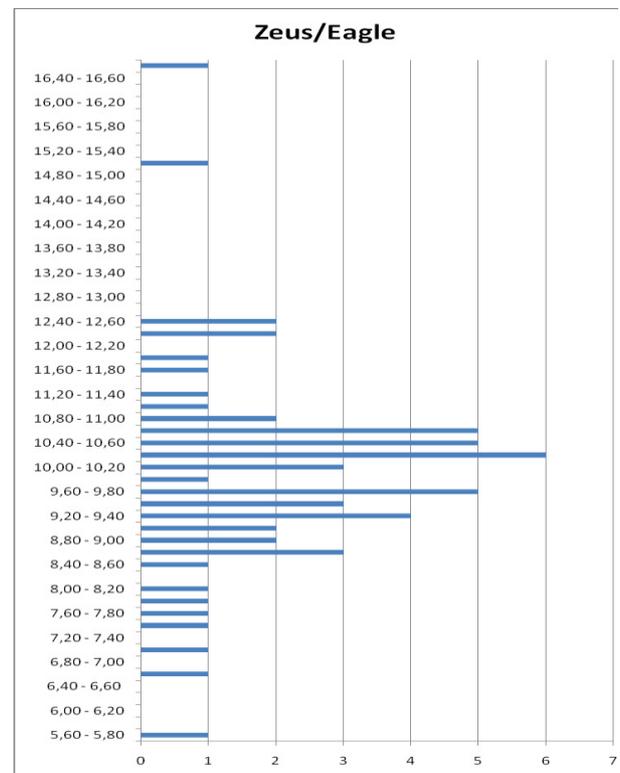


Fig. 3. Example of average



Fig. 4. Athena/Female figure on throne

15.20-15.40 g.; obverse dies: 14, reverse dies: 34), probably post-Pyrrhic, in which the two coins weigh 18.51 g. [29] and 16.33 g. [30] with a variation of 13.35% from the lightest weight; or in the case of *Persephone/Eagle* with folded wings, possibly II Punic War (maximum: 17.80 g. [31], medium: 13.49 g., minimum: 13.18 g. [32], *average*: 13.00-13.20 g.; obverse dies: 20, reverse dies: 26), in which three coins, produced by the same pair of matrices/coinages weigh between 14.17g. [33], 13.16 g. [34] and 11.73 g. [35], with a variation of 20.80%.



Fig. 5. Athena/Female figure in throne:  
Coins from the same couple of dies



Fig. 6. Persephone/Eagle with folder wings:  
Coins from the same couple of dies

A further example is provided by the series with *Persephone/Athena* standing (maximum: 17.41 g. [36], medium: 7.90 g., minimum: 2.87 g. [37], average: 4.40-4.60 g.; obverse dies: 48, reverse dies: 57), dated from the II Punic War, that includes two pieces with identical reverse and obverse weighing from 16.22 g. [38] and 13.80 g. [39], again with a difference of 17.53%, compared to the lightest weight. If we examine the weights of the coins from the same pair of obverse die only, very close in time, we can find a similar situation.



Fig. 7. Persephone/Athena standing

Considering the above-discussed issues we find that in the Zeus/Eagle series, three coins with the same obverse die weigh respectively 10.10 g. [40], 9.21 g. [41] and 8.96 g. [42] (maximum variation: 12.72%). In the *Athena/Thunderbolt* series, from the Agatoclean period, the variation is from 5.08 g. [43] to 3.07 g. [44], with a oscillation of roughly 2 grams [45], (65.47%). A similar variation in the weight of the heaviest pieces compared to the lightest ones is found in the series with *Athena/Female figure on throne*, with 5 coins produced from the same obverse die with a variation in weight between 16.27 g. [46] and 9.88 g. [47], (64.67%), while this is less the case with *Persephone/Eagle with folded wings* in which group we have three pieces minted from the same obverse die with a variation in weight between 16.39 g. [48] and 12.24 g. [49] (33.90%).

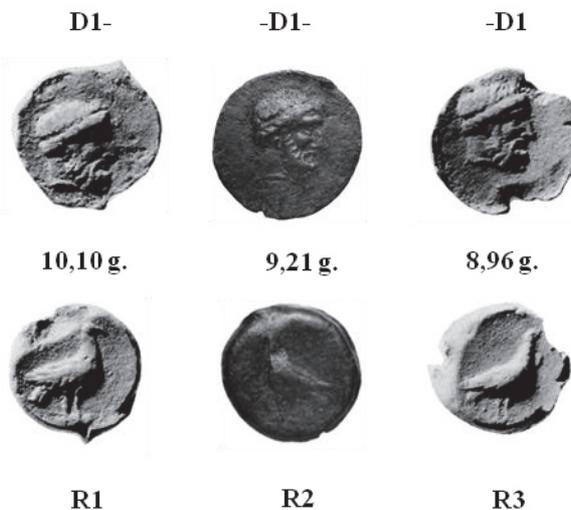


Fig. 8. Zeus/Eagle:  
Coins from the same obverse die

Such lack of attention to the weight in the series issued for a limited time only [50], would appear to be the result of a coinage “al marco” for which it was important to produce a set number of pieces from a determined quantity of metal, with considerable tolerance regarding the variations in the weight of the single pieces.



Fig. 9. Athena/Eagle:  
Coins from the same obverse die

If the coinage was minted in this way, we still have to explain the *decalage* of the average weights of the different series of bronze coins from *Lokroi* over time, and to verify the hypothesis that this decline corresponds to a reform dictated by their standard-unit, which could have been decided in line with a similar logic to that found in diverse foreign series, especially coins from Syracuse which were in plentiful circulation with the ones from *Lokroi* [51].

Hence the importance, also in terms of metrological reconstruction, of studies such as those conducted in *Lokroi*, including the recognition of the coinage used and the reconstruction of its use over time. Only through this analytic and systematic method will it be possible to fully understand the metrological and chronological *status* of the issues from the mint, including those in bronze. In this way we can understand the context and define their standard weights in each historical period and the level of autonomy with respect to other monetary standards, as well as the role played by contingent factors.

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