

The Final Series of Cast Coins and the Transition to Struck Coinage in Olbia

Key words: Olbia, cast coinage, struck coinage, dichalkon, Black Sea region, numismatics, coin hoards, monetary circulation, Greek colonies, 5th-4th century BC.

Cuvinte-cheie: Olbia, monede turnate, monede bătute, dichalkon, regiunea Mării Negre, numismatică, tezaure monetare, circulație monetară, colonii grecești, secolele V-IV a.Chr.

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The final series of cast coins and the transition to struck coinage in Olbia

The article examines the final stage of cast coin production in Olbia and the transition to struck coinage in the late 5th to the first half of the 4th century BC. Based on a comprehensive analysis of numismatic material and its correlation with archaeological data, the authors reconstruct the sequence of emissions of large cast denominations (A and B) and fractional denominations (C, D, E), including both cast and struck issues. Particular attention is paid to denomination C (dichalkon?), which plays a key role in understanding the technological transition from casting to striking. The study identifies 66 varieties of coins of this denomination and analyzes their control marks, iconography, and typology. Special significance is attributed to a coin hoard discovered in the Mykolaiv region around 2011, which contained nearly 2,000 coins and provides direct evidence for the simultaneous circulation of cast and struck coinage in Olbia. The composition of the hoard refutes the hypothesis of a return to casting after the introduction of struck coinage and instead demonstrates a gradual technological transition. The authors argue that the production of cast coins of large denominations continued alongside the emergence of struck fractional coinage, and that the complete transition to striking occurred no later than the mid-4th century BC.

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Seria finală a monedelor turnate și tranziția către monetăria bătută în Olbia

Articolul examinează etapa finală a producției de monede turnate în Olbia și tranziția către monetele emise la sfârșitul secolului al V-lea și în prima jumătate a secolului al IV-lea a.Chr. Pe baza unei analize cuprinzătoare a materialului numismatic și a corelării acestuia cu datele arheologice, autorii reconstruiesc succesiunea emisiunilor de monede turnate cu valori mari (A și B) și de fracțiuni (C, D, E), incluzând atât exemplare turnate, cât și bătute. O atenție deosebită este acordată nominalului C (dichalkon?), care joacă un rol esențial în înțelegerea tranziției tehnologice de la turnare la batere. Studiul identifică 66 de variante de monede ale acestui nominal și analizează semnele de control, iconografia și tipologia acestora. O importanță deosebită este acordată unui tezaur monetar descoperit în regiunea Mykolaiv în jurul anului 2011, care conținea aproape 2.000 de monede și oferă dovezi directe pentru circulația simultană a monedelor turnate și bătute în Olbia. Compoziția tezaurului respinge ipoteza unei reveniri la producția de monede turnate după introducerea monedelor bătute și demonstrează, în schimb, o tranziție tehnologică graduală. Autorii susțin că producția monedelor turnate cu valori mari a continuat concomitent cu apariția monedelor fracționare bătute, iar tranziția completă la batere a avut loc nu mai târziu de mijlocul secolului al IV-lea a.Chr.

Introduction

As is well known, the first coins appeared in the second half of the 7th century BC in the state of Lydia in western Asia Minor. They were produced from the natural alloy of gold and silver, electrum, and took the form of small metal ingots bearing a stamped image that certified their weight and guaranteed value [Van Alfen, Wartenberg 2020]. The earliest such coins are associated with the reign of the Lydian kings, in particular Alyattes II, while their further dissemination occurred during the time of the last king of Lydia, Croesus. From Lydia, the practice of coin minting

was rapidly adopted by the Greek poleis of Asia Minor, after which monetary circulation spread throughout the ancient world.

It should be noted that the earliest coins were struck from electrum and silver, deposits of which were accessible to the first emission centers of the Greek world. In the North-Western and Western Black Sea regions during the Archaic period, however, there were no local sources of these metals. Consequently, the earliest objects, the so-called “arrow coins” and “dolphin coins”, which the overwhelming majority of scholars rightly regard as proto-coins, were produced from copper

alloys [Orlyk 2025]. It is important to emphasize that in the ancient world up to the 5th century BC, copper and its alloys were scarcely used for coin production, the only exception being the North-Western and Western Black Sea regions.

Cast coins were produced on Berezan Island and in Olbia, Histria, Kerkinitis, and Nikonion. Such coins circulated not only within the places of their manufacture or the chora of these cities, but also far beyond their boundaries [Orlyk, Kolesnichenko 2023].

The Ukrainian archaeologist Serhii Olhovskiy has convincingly demonstrated that, until the 5th century BC, prior to the beginning of the emission of epigraphic dolphins and large cast coins, metallurgical production in Olbia was to a considerable extent sustained by the activity of itinerant craftsmen originating from the barbarian milieu. [Ol'govskii 1999, 146]. Archaeological materials analyzed by this scholar, in particular the remains of furnaces within complexes containing metallurgical waste, provide compelling evidence for the existence of mobile or temporary production units. Within such workshops, the casting of anepigraphic dolphins was likely also carried out, possibly at the initiative of or under the supervision of the civic authorities.

Production did not exhibit a standardized character: technological approaches were determined by the individual experience of the craftsmen and by the traditions of the various metallurgical centers from which they originated. This was directly reflected in the typological heterogeneity of the products, the variability of alloy compositions, and the use of raw materials of diverse origin, which precludes the existence of a single, standardized production center at this stage. As S. Olhovskiy notes, "the stability of the metal of epigraphic dolphins and asses indicates that, beginning from the mid-5th century BC, the number of itinerant craftsmen decreased and indigenous Olbian casting began to emerge. Greek founders were already working in the workshops; consequently, their products display consistent forms and dimensions, and inscriptions in the Greek language appear, which would have been impossible when coins were cast by itinerant craftsmen. Stable sources of raw materials were evidently established, and thus the metal of the epigraphic dolphins belongs to a single chemical group. Al-

loy recipes likewise became stable, which now constitutes a characteristic feature of Olbian production" [Ol'govskii 1999, 146].

Around 480-470 BC, a new type of cast coinage appeared in Olbia. These were large, round cast coins which, in historiography, are conventionally, though inaccurately, referred to as "asses". Occasionally, researchers or catalogue compilers designate such coins as "tetraobols". Given that, at present, it is impossible to determine with certainty either the original designation of these coins or their denomination, the authors consider it appropriate to identify them provisionally as denomination A.

A stylistic analysis of these large cast coins of denomination A, conducted by the authors of this study, makes it possible to distinguish six subtypes. These coins were accompanied by a fractional denomination B, probably corresponding to an obol, whose weight amounted to approximately one quarter of the larger denomination A, ranging between 67 and 82 g, with a diameter of 45-50 mm. Coins of denomination A bear the legend ΕΠΙ ΠΑΥΣΑ, while coins of denomination B are known both with the same legend and in anepigraphic form. Together, these two denominations constitute the first series of cast round coins of Olbia.

The subsequent series likewise consisted of two denominations, here also designated as A and B, though these coins were lighter than those of the preceding series. In the authors' view, this emission should be dated to 470-460 BC. The higher denomination A (type three) had a weight range of 240-280 g and a diameter of 75-78 mm. The lower (fractional) denomination B (type four) weighed up to 80 g and had a diameter of approximately 50 mm.

This series was followed, in 460-450 BC, by another emission consisting of two denominations, A and B, but of significantly reduced weight. The higher denomination A (type five) was cast with a weight of 140-150 g and bore the legend ΠΑΥΣ. Coins of this series exhibit two variants, depending on whether the reverse depicts a wheel or a star. The lower denomination B (type six) had three variants: the first two analogous to those of the higher denomination, while the third featured an inverted letter "Υ". The seventh type, belonging to the higher denomination A, shows a further

reduction in weight, to 105-135 g, and is attributed by the authors to an emission of 450-440 BC.

Earlier, reference was made to changes in the chemical composition of epigraphic “dolphin coins” in comparison with anepigraphic examples, as investigated by S. Olhovskiy, who emphasized that a similar pattern may be observed in the metal of the large cast coins, which the scholar, albeit incorrectly, termed “asses”. These large cast coins were “produced from bronze with highly stable chemical and metallurgical characteristics. Certain deviations are observed only in the metal of the earliest types of asses. Thus, the metal of these coins allows one to trace the development of metalworking in Olbia, from irregular characteristics to stable ones” [Ol'govskii 1999, 146].

Accordingly, it may be argued that by the mid-5th century BC, a unified system of coin production had been established in Olbia.

An analysis of the numismatic material, combined with archaeological evidence, enables the authors to assert that the cast coins of the APIXO group, comprising five denominations (A, B, C, D, E), were produced in Olbia in the second half of the 5th century BC, specifically in the period 440-410 (possibly 440-400) BC.

The large denomination A (type one) is a cast round coin bearing on the obverse the head of a Gorgon and on the reverse an eagle standing on a dolphin. The denomination of this coin most likely corresponded to four obols (?). This type comprises nine varieties, differing in the number of curls in the Gorgon's hair, as well as in the placement of the letter X or of all letters within the segmented composition of the reverse design. The weight of coins of this denomination ranges between 85 and 120 g.

The smaller denomination B (type two), in terms of weight, constitutes one quarter of the first denomination and most likely corresponds to an obol (?). Within this denomination, six varieties can be distinguished, exhibiting stylistic differences. The weight of these coins ranges from 25 to 28 g.

The next denomination is C, probably corresponding to a half-obol (?), which includes eight varieties. The same group of cast coinage also comprises two denominations of “dolphin coins”. The larger denomination D bears the inscription APIXO on its flat side. “Dolphin coins” of this

type weigh approximately 3-5 g and most likely correspond to the denomination of a dichalkon (?) or one-fifth of an obol (?). The smallest fractional denomination E of this series is represented by a “dolphin coin” with the inscription OY on its flat side.

Presentation of the Main Research Findings

At the end of the 5th century BC, specifically around 410 (400) BC, another transformation occurred in the coinage of Olbia, marked by a change in the iconography of the large cast coins. The coin types of denomination A featuring the head of a Gorgon on the obverse and an eagle on a dolphin on the reverse were replaced by a new type, depicting Demeter on the obverse and an eagle on a dolphin on the reverse (fig. 1).



Fig. 1. *Obverse*: Head of Demeter facing; *Reverse*: Eagle on a dolphin.

This series, like the preceding one, consisted of five denominations, which we designate as **A** (tetraobol?), **B** (obol?), **C** (dichalkon?), **D** (chalkous?), and **E** (hemichalkous?). In the authors' view, this series was produced over an extended period, possibly until 370 (350?) BC, as evidenced by the considerable number of varieties attested for each coin type.

The authors' study of the iconography of a substantial corpus of coins of denomination **A** has made it possible to distinguish fourteen varieties: (1) eagle to the left, **OΛBIH**; (2) eagle to the right, **OΛBIH**; (3) eagle to the left, **OΛBBIH**; (4) eagle to the left, with **A** below; (5) eagle to the left, with a symbol below; (6) eagle to the left, with **Γ** below; (7) eagle to the left, with **Δ** below; (8) eagle to the left, with a branch and **Δ** below; (9) eagle to the right, with a branch and **Δ** below; (10) eagle to the left, with **E** below; (11) eagle to the left, with an ear of grain below to the left; (12) eagle to the right,

with an ear of grain below to the left; (13) eagle to the right, **ΗΙΒΛ-Ο**, with an ear of grain below to the left and **Υ**; and (14) eagle to the right, **ΗΙΒΛΟ**, with an ear of grain below to the right and **Υ**.

Denomination **A** of this series had four fractional units, the largest of which was the cast coin of denomination **B**, bearing on the obverse the head of a Gorgon facing and on the reverse an eagle on a dolphin (fig. 2). Coins of this denomination weigh between 18 and 22 g and have a diameter of approximately 36-39 mm.



Fig. 2. Obverse: Head of a Gorgon facing; Reverse: Eagle on a dolphin to the left.

Our analysis of the iconography of the corpus of this type of denomination **B** coins has made it possible to distinguish fifteen varieties, which can be divided into three groups: the first group comprises eight varieties; the second, two varieties; and the third, five varieties.

Thus, the coins of the first group include cast specimens characterized by the following iconography of the reverse, namely an eagle on a dolphin, as well as by specific features of the legend (fig. 3).

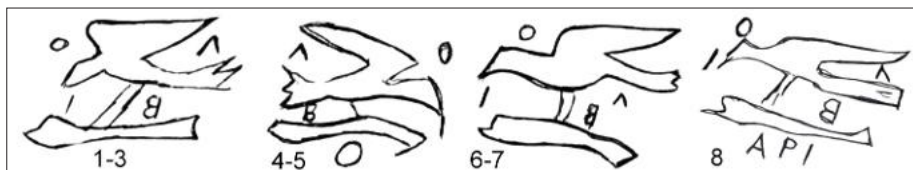


Fig. 3. Schematic representation of the reverse iconography of coins of the first group (author E. Kolesnichenko).

These coins also differ in the iconography of the Gorgoneion on the obverse, specifically in the depiction either without a protruding tongue or with a protruding tongue. In combination with the reverse types presented in fig. 3, the coins of this group comprise eight varieties: (1) Gorgon without tongue; (2) Gorgon with tongue; (3) O

beneath the dolphin, Gorgon without tongue; (4) Gorgon without tongue; (5) Gorgon with tongue; (6) Gorgon without tongue; (7) Gorgon with tongue; (8) Gorgon with tongue, with the control mark **API**.

It should be noted that the eighth variety identified in our study, in addition to the ethnic **OABI**, bears the control mark **API**. This coin type is known to researchers; however, due to its poor state of preservation and subsequent restoration (mechanical cleaning of the coin), the control mark was previously misidentified as **KPI** [Anokhin 2011, 42, no. 186].

As for the second group, we assign to it two varieties featuring on the obverse the head of a Gorgon with a protruding tongue and the following variants of the reverse (fig. 4).

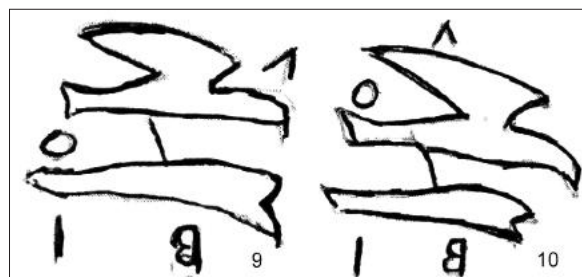


Fig. 4. Schematic representation of the reverse iconography of coins of the second group (author E. Kolesnichenko).

Coins of the third group all bear the depiction of the Gorgoneion with a protruding tongue and differ in the legends on the reverse, as clearly illustrated by the schematic representations of the reverses in fig. 5.

As for the lower denominations, the analysis of the corpus of specimens available to us allows for the identification of three

such denominations: **C** (dichalkon?), **D** (chalkous?), and **E** (hemichalkous?).

Particularly informative for understanding the transition from cast to struck coin production in Olbia is denomination **C**, since the earliest coins of this type were cast (fig. 6). However, most likely due to the technological inconveniences associated with the production of small cast coins, the Olbian mint was compelled to adopt coin production by striking.

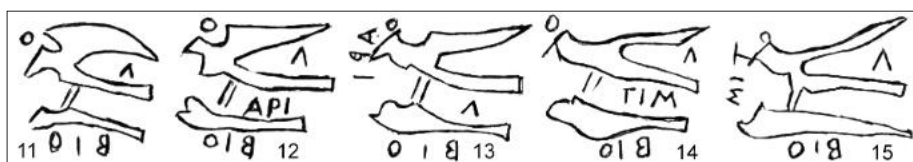


Fig. 5. Schematic representation of the reverse iconography of coins of the third group (author E. Kolesnichenko).



Fig. 6. Cast small denomination C (dichalkon?) of Olbia (not to scale).

Thereafter, casting was used exclusively for the production of coin blanks, which were subsequently transformed into coins through the process of manual striking. Technological changes in the production of the lower denominations, specifically denomination C (dichalkon?), gave rise to the phenomenon of the simultaneous manufacture of large cast coins of two denominations, most likely the tetraobol (?) and the obol (?), alongside struck coins of smaller denominations and their concurrent use in monetary circulation.

Evidence for the contemporaneous, not merely parallel but indeed simultaneous, circulation of cast and struck coins is provided by a coin hoard discovered in the Mykolaiv region around 2011. Information about this hoard, as well as several photographs of it (fig. 7) and of individual coins included in its composition, was obtained in 2013 by one of the authors of this article from a well-known, though unfortunately now deceased, collector from Mykolaiv.

The hoard comprised nearly 2,000 coins, including large cast coins with Demeter (denomination A), cast coins with the Gorgon (denomination B), as well as both cast and struck coins of denomination C represented by several dozen varieties. Notably, cast specimens of denomination C constituted nearly 10% of the total number of coins of this type.

The presence within the hoard of large cast denominations A and B provides decisive evidence against the hypothesis of a return to cast coin production following the introduction of struck fractional coinage.

At the same time, the coexistence of both cast and struck coins of denomination C points to a gradual transition from casting technology to striking.

It should be emphasized that the quality of manufacture of cast coins of denomination C was rather low: the majority of specimens exhibit technological defects inherent to this method of production. In particular, some examples display the defect of incomplete casting, manifested in the absence of part of the design or the coin edge due to an insufficient volume of molten metal. In the authors' view, it was precisely the technological difficulties associated with the production of small fractional denominations, particularly denomination C, that acted as a catalyst for the transition from casting, whereby molten metal was poured into molds and characteristic defects arose, to the striking of coins on cast blanks.



Fig. 7. Hoard of cast and struck coins of Olbia from the late 5th to the first half of the 4th century BC, discovered in the Mykolaiv region.

The authors' analysis of the iconography of Olbian cast and struck coins of denomination C (dichalkon?) within this series has made it possible to distinguish 66 types of such coins (Table 1).

The data presented in Table 1 indicate the existence of sixty-six varieties of coins of denomination C (dichalkon?), of which seven varieties

#	Control mark	Head of Demeter left	Head of Demeter right	Eagle left	Eagle right
1	Cast coin, without control mark		×		×
2	Struck coin, without control mark		×		×
3	As above	×			×
4	As above	×		×	
5	As above		×	×	
6	ΟΑΒ:ΙΟ	×		×	
7	ΟΙΒΛΟ		×		×
8	BA beneath the dolphin		×		×
9	EY beneath the dolphin		×		×
10	TI beneath the dolphin		×		×
11	ΑΡΚΑ beneath the dolphin		×		×
12	ΑΡΚΑ beneath the dolphin	×			×
13	ΑΡΙΣΤ beneath the dolphin	×			×
14	ΑΡΙΣΤ beneath the dolphin	×		×	
15	ΑΝΔΡ beneath the dolphin	×			×
16	ΚΑΛΛΙ beneath the dolphin	×			×
17	ΜΟΝΙ beneath the dolphin	×			×
18	ΜΟΝΙ beneath the dolphin	×		×	
19	ΞΕΝΟ beneath the dolphin	×			×
20	ΞΕΝΟ beneath the dolphin	×		×	
21	ΗΡΑΓΟΡΑΣ beneath the dolphin	×			×
22	ΗΡΑΓΟΡΑΣ beneath the dolphin	×		×	
23	ΙΤΟ beneath the dolphin	×			×
24	ΛΕΟΝΤ beneath the dolphin	×			×
25	ΚΡΙ beneath the dolphin	×			×
26	ΗΜ beneath the dolphin		×		×
27	ΗΜ between the tails of the eagle and the dolphin		×		×
28	ΟΞΟ between the tails of the eagle and the dolphin		×		×
29	ΞΘ between the tails of the eagle and the dolphin		×		×
30	ΟΞ – Θ between the eagle and the dolphin		×		×
31	ΟΞΘ beneath the dolphin		×		×
32	ΦΗ beneath the dolphin		×		×
33	ΩΦΗ beneath the dolphin		×		×
34	ΙΩΦΗ beneath the dolphin		×		×
35	ΥΞ beneath the dolphin		×		×
36	ΦΥΞ beneath the dolphin		×		×

37	ΦΥΕ Η beneath the dolphin		×		×
38	EYBIO beneath the dolphin		×		×
39	ΙΕΥΕ beneath the dolphin		×		×
40	ΥΕΙΕ beneath the dolphin		×		×
41	ΟΛΒΙΟ ΕΙ над орлом, ΥΕ beneath the dolphin		×		×
42	ΙΕ between the tails of the eagle and the dolphin, ΥΕ beneath the dolphin		×		×
43	ΥΕ between the tails of the eagle and the dolphin, ΙΕ beneath the dolphin		×		×
44	ΘΙΕ between the tails of the eagle and the dolphin, ΥΕ beneath the dolphin		×		×
45	ΥΙΕ beneath the dolphin		×		×
46	ΥΕ над хвостом орла, ΙΕ between the tails of the eagle and the dolphin		×		×
47	ΘΥΕ between the tails of the eagle and the dolphin		×		×
48	ΥΕ between the tails of the eagle and the dolphin, ΥΙΕ beneath the dolphin		×		×
49	ΙΕ between the tails of the eagle and the dolphin, ΥΡΕ beneath the dolphin		×		×
50	ΙΕ between the tails of the eagle and the dolphin, ΥΥΕ beneath the dolphin		×		×
51	ΔΙΟ beneath the dolphin		×		×
52	ΔΙΟ beneath the dolphin		×	×	
53	ΔΙΟΝ beneath the dolphin		×	×	
54	ΔΙΟ between the tails of the eagle and the dolphin		×	×	
55	ΑΘΗ beneath the dolphin		×	×	
56	ΑΘΗ between the tails of the eagle and the dolphin		×	×	
57	ΑΔΕΙ beneath the dolphin		×	×	
58	Α behind the eagle's head, ΔΕΙ beneath the dolphin		×	×	
59	ΟΛΒΙΟ inverted 180°		×	×	
60	ΑΠΙ beneath the dolphin		×	×	
61	ΕΥΠΡ beneath the dolphin		×	×	
62	ΕΥΠΡ beneath the dolphin, ΟΙΒΛΟ		×	×	
63	ΙΕΞΟΠ beneath the dolphin		×		×
64	ΠΟΣΕΙ beneath the dolphin, ΟΙΒΛΟ		×	×	
65	ΠΟΣΕΙ beneath the dolphin, ΟΛΒΙΟ		×	×	
66	ΑΡΤΕ beneath the dolphin				

Table 1. Types of coins of denomination C (dichalkon?) of Olbia

lack control marks, while the remaining fifty-nine varieties bear at least twenty-eight different names, assuming that the control marks $\Theta\Theta$, Θ ; ΨH , $\Omega\Psi\text{H}$, $\text{I}\Omega\Psi\text{H}$; $\Upsilon\Xi$, $\Phi\Upsilon\Xi$; EYBIO ; $\text{I}\Xi\Upsilon\Xi$, $\Upsilon\Xi\text{I}\Xi$, $\Upsilon\Xi$, $\Psi\Xi$, $\Theta\Upsilon\Xi$; ΔIO , ΔION belong to only five individuals.

The absence of these names in the eponymous calendar of Olbia for the first half of the 4th century BC may suggest that they belonged to individuals who did not hold magistracies but were nevertheless involved in coin production, or in whose name these coins were struck. The right to mint may have been granted on a tax-farming basis, which precludes a reliable prosopographical analysis. All this contradicts the thesis that these coins were struck by magistrates holding office for a single year.

Incidentally, a similar situation is observed in the later emissions of Olbian coins known as the “Borysthenes,” on which more than one hundred control marks have been recorded, while according to archaeological data they could have been issued over no more than 70–80 years.

Coins of denomination **B** with the control mark **TIM** (third group) are associated with coins of denomination **C** bearing the control mark **TI**, while coins of denomination **B** with the control mark **API** (second and third groups) are linked to coins of denomination **C** with the control mark **APIΣ**.

In addition, coins bearing the control mark **APKA** serve as a unifying element for coins of denomination **C** (dichalkon?) in which a change in the orientation of the depiction of Demeter occurs: coins no. 11 feature a right-facing image, whereas no. 12 shows a left-facing one. Fig. 8 illustrates this shift in the iconography of denomination **C** (dichalkon?) coins.

Among the types of coins of denomination **C** (dichalkon?) identified by us are specimens that scholars have attributed both to coins issued in the first third of the 4th century BC [Nechitailo 2000, 24; Anokhin 2011, 42] and to a later emission, in particular to the so-called obol series [Turovskii, Dem’ianchuk 2000; Nikolaev 2023; Nikolaev 2025].

The introduction into scholarly circulation of a cast coin of denomination **C** (dichalkon?) within the context of the 2011 hoard significantly alters our understanding of the transition from cast to struck coinage in Olbia. The 2011 coin

hoard from the Mykolaiv region, where the remains of Olbia and its chora are located, provides a “snapshot” of monetary circulation in the first half of the 4th century BC and demonstrates the simultaneous use in Olbia of large cast coins of denominations **A** (tetraobol?) and **B** (obol?), together with both cast and struck coins of denomination **C** (dichalkon?), which functioned as their fractional unit.

The absence in the hoard of certain varieties of coins of denomination **C** (dichalkon?), in particular those bearing the name **APTE**, suggests that the hoard was deposited prior to the completion of the simultaneous issue of cast and struck coins and, accordingly, before the transition to the exclusive production of Olbian coinage by striking, as was the case with the so-called obol series.

Associated with coins of denomination **C** (dichalkon?) are the smaller fractional denominations **D** (chalkous?) and **E** (hemichalkous?) of this series.

The authors’ study of denomination **D** (chalkous?) shows that all coins share a common obverse type depicting Demeter facing right, while the reverse, bearing the legend **OABIO** together with a dolphin and an ear of grain, allows for the identification of five varieties. Specifically: (1) dolphin to the right, ear of grain below also to the right; (2) dolphin to the right, ear of grain to the left; (3) dolphin to the left, ear of grain to the left; (4) dolphin to the right, ear of grain to the left, with the letter **I** omitted from the legend; (5) dolphin to the left, ear of grain to the right.

As for the smallest denomination **E** (hemichalkous?) of this series, four varieties may be distinguished: (1) **OABI**, dolphin to the right, ear of grain to the right; (2) **OABIH**, dolphin to the right, ear of grain to the right; (3) **OABI**, dolphin to the left, ear of grain to the left; (4) **OABI**, dolphin to the right, ear of grain to the left.

It should be emphasized that the coins of the small denominations in the series under study were struck on flans that differ significantly from those of the so-called “obol series” and could not have been produced contemporaneously with them.

Conclusions

The study conducted by the authors makes it possible to formulate a number of conclusions that substantially revise established views on the

coinage of Olbia in the late 5th to the first third (first half?) of the 4th century BC.

First, there was no return to the production of coins by casting after the appearance of the first struck coinage. Cast coins of the larger denominations **A** (tetraobol?) and **B** (obol?), as well as the smaller denomination **C** (dichalkon?), were produced chronologically after the completion of the emission of the cast coins of the preceding series, namely the coin types of the **APIXO** group.

Second, the study of Olbian cast and struck coins of denomination **C** (dichalkon?), together with their presence in the 2011 hoard alongside large cast coins of denominations **A** and **B**, dem-

onstrates the simultaneous circulation in Olbia of cast coins of denominations **A** (tetraobol?) and **B** (obol?), cast coins of denomination **C** (dichalkon?), and struck coins of denominations **C** (dichalkon?), **D** (chalkous?), and **E** (hemichalkous?).

This coinage series, comprising large cast coins alongside smaller (fractional) cast and struck denominations, was subsequently replaced by the so-called "obol series". In the monetary history of Olbia, no later than the mid-4th century BC, a complete transition took place from the production of coins by casting to their manufacture by striking.

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