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## DIOCLETIAN'S CURRENCY SYSTEM AFTER 1 SEPTEMBER 301 AN INQUIRY INTO VALUES

*Abstract – On 1 September AD 301, Diocletian's currency system was revised, doubling the face value of the nummus and possibly of other coins. The role in circulation and the nominal value of all coins both before and after the revaluation are examined. The aureus no longer circulated and the argenteus and the rare small laureate copper fractal did not effectively circulate either. The nummus became the pivot of the tetrarchic currency system, flanked by the aes radiate fractals. The new currency system, designed to be trimetallic, developed into a monometallic system. Nominal values of the coins, sometimes diverging from the existing arrangements are suggested and a new post-301 currency scheme is proposed.*

**D**IOCLETIAN'S COIN REFORMS radically changed Roman currency: in 286 the weight standard of the *aureus* had been improved, and in 294 new coins were introduced: the *argenteus*, the *nummus* and two copper fractals. On 1 September 301 the face value of some of the coins was doubled. The Currency Revaluation inscription, discovered at Aphrodisias in 1970, informed the public of this readjustment (*geminata potentia*) and also of the fact that the coins themselves remained unchanged.

The actual nominal values of the coins have been discussed for over 65 years now without consensus on all coins. Initial values were not fully known and the Revaluation inscription as we have it now shows lacunas and is ambiguous.

At the moment, fifteen individual currency schemes have been proposed (table 1, p. 171). In this review, we will present a sixteenth, somewhat contrary but in our view more plausible currency scheme, not only based on numismatic data, but also guided by epigraphy, papyrology, economics and iconography.

We will also analyse which of the coins actually circulated. Not all did, as we will show.

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## 1. Diocletian's currency

From 286 on the *aureus* was struck at an improved weight standard of 60 to the Roman pound (ideally 5.42 g). In 294 the silver *argenteus* was introduced, at 96 to the *lb* (3.39 g), around 90% fine. Three more coins entered circulation in 294. An innovation was the argentiferous *nummus*, struck at 32 to the *lb* (10.16 g). Its silver content was on average 3-3.5%, but lower at the western mints.

Two copper fractals were introduced: a small laureate coin, 256 to the *lb* (ca. 1.27 g), and a larger radiate coin, struck at 108 to the *lb* (ca. 3.01 g).

The radiate fractal has been called the *neo-antoninianus*<sup>[1]</sup> and is known as the 'post-reform radiate' to most collectors.

The new radiate fractal is about the same size as the heavier (3.87 g) *aurelianianus*, the post-274 radiate coin introduced by Aurelian to replace the debased *antoninianus*. The *aurelianianus* was argentiferous, the new radiate fractal was not.

The discussion on the nominal values of the coins for the members of the first tetrarchy often focusses on the year 301. On 1 September 301, the Currency Revaluation came into effect, and between 20 November and 10 December of that year the Edict on Maximum Prices entered into force.

## 2. The Currency Revaluation

We may assume that the main objective of the Currency Revaluation was the protection of the soldiers from the impact of inflation<sup>[2]</sup>. The preface of the Edict of Prices states: 'By the purchase of one thing a soldier is deprived of his bonus and his salary'<sup>[3]</sup>. Soldiers complained and troubles between soldiers and merchants were reported from Antioch<sup>[4]</sup>.

The first countermeasure was the currency revaluation. The Currency Revaluation inscription, found in Aphrodisias in 1970, was made available with a first interpretation<sup>[5]</sup> and later comprehensively published and analysed<sup>[6]</sup>. In following years, new fragments have been found, but not all of these finds have been published.

The most recent reconstruction has been published in 2015<sup>[7]</sup>. We can infer that a double(d) nominal value was assigned to (some?) coins: *gemi-*

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[1] Callu 1969, pp. 369, 392.

[2] Böhnke 1994, p. 479-480.

[3] Kropff 2016.

[4] Corcoran 2000<sup>2</sup>, p. 219.

[5] Erim, Reynolds & Crawford 1971.

[6] Roueché & Reynolds 1989.

[7] Strobel 2015.

*nata p[ote]ntia*, but the available fragments do not allow a complete reconstruction of the currency scheme after the revaluation. For now we will give a short summary of the coins and values found in the inscription. Details and a reconstruction will be discussed in the paragraphs on the individual coins below.

We can be certain that the silver *argenteus* had a post-revaluation value of 100 *dc*, as both this coin and its value are mentioned. The *dc* should be read as *denarii communes*; the *denarius* had by now evolved into a unit of account and no longer was a circulating coin.

Some details referring to two, maybe three other coins are preserved. The first coin mentioned is the *bicharacta*, a coin designation not encountered before and not clarified in the inscription itself. The nearest translation would be 'double struck' which is rather ambiguous. The reconstruction of the text seems to give a nominal value of 4 *dc*. An additional unidentified coin may be mentioned, also with a nominal value of 4 *dc*.

After initial reluctance in the first publication of the inscription, a coin value of 25 *dc* is now recognized, in part reconstructed, but the matching coin is not mentioned in the fragments of the inscription now available.

What could have been the results of the revaluation? Simply doubling nominal coin values would not overcome inflation. The accumulated value of the currency in circulation (*M*) increased, while the velocity of circulation (*V*) and the total volume of goods and services available for transactions (*T*) most likely remained the same. Under these conditions, Fisher's Equation of Exchange ( $M \times V = P \times T$ ) predicts a further upswing of prices (*P*)<sup>[8]</sup>. To head off this effect, price control would have to be carried into effect, and this was provided by the Edict on Maximum Prices, issued a few months later.

### 3. The Edict on Maximum Prices

The Currency Revaluation and the Price Edict were probably planned as a two-pronged strategy, although neither the Price Edict nor the Currency Revaluation mentions the other measure. The interval of three months between the two applied instruments seems to plead against coherence. On the other hand, three months seems too short to monitor the increase of prices, to plan, write and compile the Edict on Maximum Prices as *ad hoc* reparative legislation and to produce the inscriptions. A double approach and a direct relation seems more plausible<sup>[9]</sup> and would raise Diocletian's economic policy above the level of naivety frequently attributed to it.

The Edict on Maximum Prices, which came into force between 20 November and 10 December 301, was found on a number of sites, with one

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[8] Fisher, 1911; Jungck 1976, p. 27.

[9] Strobel 2015, p. 153-154.

exception all in the East. The reconstructed text of the edict gives more than 1,200 maximum prices for goods, services, wages, transport, animals, and even slaves. Several publications are available<sup>[10]</sup>. An up to date English translation was published recently<sup>[11]</sup>. The edict gives maximum prices in *denarii communes*.

Were these two economic measures effective? Lactantius reports a total failure: after much bloodshed (violating the Price Edict was a capital offence) the edict, which had resulted in withholding goods from the market and a further increase in price level, had to be repealed after a short period (*De Mortibus Persecutorum*, 7.6-7.7). Lactantius however was a hostile source and has been proven quite unreliable on court proceedings and actions of the tetrarchs<sup>[12]</sup>. But writing for contemporaries on events witnessed by his public he might quite well have been credible on the Price Edict, all the more as the reported events precisely match the outcome predicted by economic theory: price control leads to shortage and stagnation<sup>[13]</sup>.

Most modern authors follow Lactantius and state that both the revaluation and the Price Edict were a failure<sup>[14]</sup>.

Böhnke however reports a decrease of inflation in Egypt<sup>[15]</sup> and Ermatinger finds compliance to the edict prices in papyri dating from years later<sup>[16]</sup>, but all this might have been coincidental and not a sign of compliance with the provisions of the Price Edict<sup>[17]</sup>. Moreover, both findings are based on a limited and geographically restricted dataset.

Diocletian's double approach of inflation was new and quite sophisticated, but diachronic studies show comprehensive price control to be ineffective, so most likely this policy would also have failed at the beginning of the 4<sup>th</sup> century.

#### 4. The currency schemes

Table 1 presents all fifteen currency schemes up to now. The table is chronological and we have inserted visual caesurae for potential turning points in the research: a bold line indicates the publication of the Currency Revaluation Inscription of Aphrodisias in 1971, and a double line indicates the publication in 1979 of the inscription of the Price Edict in Aezani, which included undamaged fragments on the maximum prices for gold.

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[10] Graser 1940; Lauffer 1971; Giacchero 1974.

[11] Kropff 2016.

[12] Leadbetter 2012.

[13] Scott Morton 2001.

[14] Jungck 1976, p. 32; Potter 2004, p. 334-335; Verboven 2007, p. 257.

[15] Böhnke 1994, p. 481.

[16] Ermatinger 1990, p. 49.

[17] Corcoran 2000<sup>2</sup>, p. 232-233.

Table 1 – Nominal value in *denarii communes* of the coins, before (<) and after (>) 1 September 301

The – indicates the coin is not included in the review; a ? indicates the coin is examined but the author does not decide on the value or, if placed after a value, that it is not certain; a dark cell indicates that the coin was not examined for the period concerned.

Source	Aureus		Argentus		Nummus		Copper radiate		Pre-294 Aurelianus		Copper laureate	
	<	>	<	>	<	>	<	>	<	>	<	>
West 1951	1,000		50		10		4		10		1	
Sutherland 1961	–	–	–	–	5		2			–	1	
Erim <i>et al.</i> 1971	?	?	50	100	10	20	5	5	–	–	2	2
Lafaurie 1975	1,000	1,200	50	100	8?	10?	–	–	–	4	–	–
Cope 1977		1,500		100		20		2		4		1
Leiner 1980	–	–	–	–	–	–		4	–	–		2
Harl 1985	?	?	50	100	12 ½	25	?	5?	?	5?	?	2
Hendy 1985	1,200	1,200	100	100	12 ½	25	2	4	–	–	1	2
Depeyrot 1992	?	1,250	50	100	12 ½	25	?	4	–	–	–	–
Böhnke 1994	1,250	1,250	50	100	12 ½	25	2	2	5	5	1	1
Harl 1996	1,200	2,400	50	100	12 ½	25	2.5	5	2.5	5	1	1
Estiot 2012	?	1,200	50	100	12 ½	25	4	4	?	?	?	2
Pannekeet 2013	1,000	2,000	50	100	10	20	2	2	2.5	5	1	1
Posner 2015		2,000		100		25		2		4		1
Strobel 2015	1,000 +200*	1,000 +200*	50	100	12 ½	25	2	4	2	4	1	1
Kropff 2017	n.a.**	n.a.**	100***	100***	12 ½	25	2?	4	?	4	n.a.**	n.a.**

\* Premium 200 *dc* when exchanging to other denomination

\*\* No nominal value, coin did not circulate

\*\*\* Circulated on a restricted level

Not all schemes cover the full range of coins in circulation in 301, but most do. A number of currency schemes present the coin values both before and after 1 September 301.

A word on some of the applied methods. Sometimes the nominal value of the coins has been calculated in relation to their intrinsic value, based on metallurgical analyses and the maximum prices for metals from the Edict on Maximum Prices<sup>[18]</sup>. This method has not only been applied to the *aureus* and the *argenteus*, but also to the argentiferous *nummus* and the radiate and laureate fractals. As the *nummus* and the fractals were fiduciary currency and even the *argenteus* had a fiduciary component, this method is not unproblematic.

Price statistics based on the Edict on Maximum Prices have been used to determine the nominal value of coins, but this method should be applied with care. The occurrence of maximum prices of 2 *dc* was thought to indicate a coin with this value, but the prices of 1 and 2 *dc* are for the most part prices of account and not transaction prices, as one unit of the product or service would not realistically have been purchased. We will discuss prices apparently necessitating coins with a nominal value of 1 and 2 *dc* in the next paragraphs on the individual coins.

## 5. Aureus



Fig. 1 – Aureus for Diocletian, Rome mint  
(RIC V-II 142a)

Diocletian's heavier *aureus* (fig. 1) was produced from 286 onwards at a weight of 60 to the Roman pound, a theoretical weights of 5.42 g of almost pure gold. Nominal values between 1,000 and 2,400 *dc* have been proposed (see table 1). The higher nominal values were sometimes substantiated by the premium in the nominal value of the *argenteus*, 60% above the intrinsic value.

Also, price statistics based on the Edict on Maximum Prices have been used to determine the nominal value<sup>[19]</sup>. For instance, a theoretical 2,000 *dc aureus* would pay for more (109) products or services without the aid of other denominations than a 1,200 *dc* (39) or a 1,500 *dc* (64) *aureus*. When a 2,000 *dc aureus* is proposed on the basis of these statistics, this seems plau-

[18] Cope 1977A & 1977B.

[19] Possner 2015, p. 12; Cope 1977B, p. 9.

sible but is erroneous. Exchanging ('selling') an *aureus* for 20 *argentei* with a nominal value of 100 *dc* each would constitute a violation of the provisions of the Edict on Maximum Prices and hence would be punishable by death, as we will demonstrate.

We will take more characteristics of the *aureus* into account, not just the premiums in other coins or price statistics. We will consider the probable size of production as suggested by surviving specimen, hoards, site finds, signs of wear and circulation and the role and function of the gold coinage of the first tetrarchy.

The introduction of a heavier *aureus* in 286 and of the (silver) *argenteus* in 294 were an attempt to restore the traditional Roman trimetallic coin scheme. The *aureus* however was produced in rather limited quantities, judging by the number of surviving specimen. For the majority of emissions from most mints, ten to twenty specimen were recorded at the time *RIC VI*<sup>[20]</sup> was compiled. For Trier, Ticinum, Carthago, Siscia, Thessalonica, Nicomedia, Antiochia and Alexandria, the majority of *aureus* emissions were only represented by one to five specimen. A rather small number of emissions however survive in an ample number of specimen.

This reluctant introduction of the new *aureus* in fact precludes the function of a circulating currency.

Hoards illustrate the role and function of the gold coinage from this period. The hoard of Beaurains (Arras) includes many *aurei* and multipla from the Rome and Trier mints, issued on the occasion of *donativa*<sup>[21]</sup>, for instance on the occasion of the reconquest of Britannia after the defeat of the usurper Allectus in 296 or of the *vincennalia* of Diocletian and Maximian in 303. Numerous die-links can be established between the various specimen. The coins were hoarded as soon as they had been distributed. All gold coins for the tetrarchy from Rome and Trier are in a pristine uncirculated condition.

The hoarder may have been a high official or military commander, in service from 285 to 310 in Rome and Trier, sharing in the *donativa* there.

The hoard also contains *aurei* from the period of the tetrarchy from other, more distant mints, but most of these coins are also in pristine condition, and were apparently not taken from circulation. The hoard of Beaurains suggests that Diocletian's *aurei* did not circulate as currency. This impression is confirmed by other gold hoards<sup>[22]</sup>.

In fact, we have reason to assume that the use of *aurei* by now was confined to *donativa*. In the later 3<sup>rd</sup> century, *donativa* had become an important component in the pay of both soldiers and high army officers. The two

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[20] Sutherland 1967.

[21] Bastien 1977, p. 194-204.

[22] Depeyrot 1992, p. 35.

other components of army pay (the thrice yearly *stipendia* or regular pay and *annona* or payment in kind) had to be supplemented by these *donativa* <sup>[23]</sup>.

Earlier *aurei* had gradually disappeared even from late 3<sup>rd</sup>-century hoards and stray finds. Gold coins were eventually demonetized and melted by the public <sup>[24]</sup>, probably for the production of marketable ingots. During and since the last decades of the 3<sup>rd</sup> century it would have been virtually impossible to ‘buy’ an *aureus* in this highly inflationary economy using the other debased or overvalued coins (*antoniniani* and *aureliani*) and this situation continued into the first decade of the 4<sup>th</sup> century, when a different currency (*argentei*, *nummi* and copper fractals) circulated. This development drove the *aurei* out of circulation.

The gold bullion function of the *aurei* is confirmed by the Aezani inscription of the Edict on Maximum Prices <sup>[25]</sup>:

#### Chapter 28.1 [*De aur*]o

1a	[ <i>Aur</i> ]i obruzae in regulis sive [in] solidis vac. pondum unum (Gold, refined, in bars or coins, one lb)	72,000 dc
2	[ <i>Au</i> ]ri neti vac. pondum unum (Spun gold, one lb)	72,000 dc
...		
9	<i>De argento hoc est pusula primi pondum I</i> (Refined silver of the first quality, 1 lb)	6,000 dc

Gold, in whatever form, ingots, coins or gold thread, is treated as a commodity with the same maximum price. This is, as we have shown, not an *ex novo* position of the *aureus*, but the confirmation of a condition that had existed for decades.

Silver is only considered a commodity in bullion form, coins are not mentioned. This is illustrated by the intrinsic and nominal value of the silver *argenteus*, a coin further discussed in detail in the next paragraph.

A pound of silver, at a maximum bullion price of 6,000 dc would yield 96 *argentei* with an intrinsic value of 62.5 dc each, disregarding the small share of other metals in the alloy. At a nominal value of 100 dc the *argenteus* had a premium of 60% over the intrinsic value.

The *aureus* however could not be circulated (and later be exchanged or sold) at a nominal value above the intrinsic value of 1,200 dc ( $\frac{1}{60}$  of 72,000 dc) simply because the Edict on Maximum Prices declared this illegal. The *aureus* was not currency like the other coins, it functioned simply as a storage of value <sup>[26]</sup>.

<sup>[23]</sup> Abdy 2012, p. 589.

<sup>[24]</sup> Scheidel 2010, p. 104-105.

<sup>[25]</sup> Crawford & Reynolds 1979, p. 176.

<sup>[26]</sup> Hendy 1985, p. 451-452; Estiot 2012, p. 543-544.

Even with the necessary restraint due when comparing modern coins with ancient currencies, Diocletian's *aureus* appears to resemble the present day *Krugerrand* and many other modern bullion type coins.

But of course, there is an important difference: the *Krugerrand* was designed to be a bullion type coin while the late *aureus* evolved into one.

The return of a circulating gold coin came only in 309, when Constantine introduced the lighter *solidus* in large quantities.

All factors considered, we have decided to exclude the *aureus* from the circulating coins in the proposed currency scheme for September 301 (see table 1).

## 6. Argenteus



Fig. 2 – Argenteus for Constantius, Ticinum mint  
(RIC VI 13a)

The Currency Revaluation inscription of 1 September 301 states that the nominal value of the *argenteus* (fig. 2) was 100 *dc*. The second block of the Currency Revaluation inscription from Aphrodisias, with text supplements between square brackets as suggested by Karl Strobel<sup>[27]</sup>, reads:

- ℓ.1 co(n)§85[--- (ca. 17 characters) ---]re[. . . . .]co te[. . . . .]  
a]rgenteus centum denariis [valet atque nummus vigin-]
- ℓ.2 ti quinquae (sic!) den[ari]orum potentia vige[at. cui]us legis observantiae  
etiam fiscum no[st]rum subiectum
- ℓ.3 esse scire te co<n>γ[en]it ut scilicet ex kal(endis) se[pte]mb(r)ibus Titiano et  
Nepotiano cons(ulibus) (vac.) hii debitores quicumque
- ℓ.4 esse novi coeperint etiam fisco geminata p[ote]ntia ea(n)dem tradant  
pecuniam parique condicione si usus e-
- ℓ.5 xigat etiam fisco adnumeret (vac.) super his autem debitoribus qui ante  
kal(endas) Septemb(res) diem vel i<n> fiscalibus
- ℓ.6 debitis deprehendentur vel in privatis contractibus monstrantur obnoxii  
iustum esse aequissimumque
- ℓ.7 perspicitur hanc adhiberi observantiam et eandem pecuniam ita numerent ut  
valuisse cognoscitur antequ-
- ℓ.8 am et per provisionem nostram propter unius observantiam leg<is> facta  
fuerit adcessio nec iniquitatem ullam
- ℓ.9 statuti putent quibus ista condicio praescribitur cum in ea potentia pecuniam  
repraesentare videantur in qua
- ℓ.10 eos suscepisse manifestum est. vac.

<sup>[27]</sup> Strobel 2015, p. 170-171.

Lines 1 and 2 supply the nominal values of the *argenteus* (100 *dc*) and the *nummus* (25 *dc*). The declaration of the twofold increase (*geminata p[ote]ntia*) in line 4 does not answer the question which of the coins in circulation were involved.

The text of the Currency Revaluation inscription has been interpreted as indication that the nominal value of the *argenteus* was doubled from 50 to 100 *dc*<sup>[28]</sup>. An alternative interpretation however is, that the *nummus* (and perhaps also the radiate fractals and *aureliani*) were doubled in value, while the value of the other coins, including the *argenteus* was merely confirmed<sup>[29]</sup>.

We would be inclined to endorse the latter interpretation, primarily because an initial introduction of the *argenteus* at a nominal value of 50 *dc* would have brought the face value very close to the production costs<sup>[30]</sup> which is not plausible in view of the usual premiums / surpluses observed in Roman coin production. For instance, the *nummus* with a nominal value of 12 ½ *dc* before the revaluation and a metal (or intrinsic) value of 8.39 *dc*<sup>[31]</sup> had a premium of close to 50%.

We will show below that the *nummus* was freely available in large quantities, whereas we have concluded that the *aureus* was not in circulation while the *argenteus* was scarce in the coin pool. Doubling merely the value of the *nummus* would have adjusted the only coin used in practice in the payment of debts and taxes<sup>[32]</sup> and the regular soldier's pay.

The *argenteus* was probably produced in limited quantities<sup>[33]</sup> and hardly left a trace in site finds in many areas. For instance: the Portable Antiques Scheme in the United Kingdom includes more than 400 *nummi* from site finds for the members of the first tetrarchy and only three *argentei* for this period ([www.finds.org.uk](http://www.finds.org.uk)), while the coin is very scarce in site finds from Dacia and the provinces of the Middle and Lower Danube<sup>[34]</sup>.

*Argentei* are also scarce in hoards<sup>[35]</sup> notwithstanding the Sisak hoard. One of the reasons the production of *argentei* was restricted, could have been the cost to yield ratio<sup>[36]</sup>. A pound of silver used in an alloy to produce *nummi* yielded a more favourable bullion cost to nominal value ratio and a higher premium than producing *argentei* from the same pound of silver would have done. The incentive to produce *argentei* was lacking.

[28] Strobel 2015, p. 155–156; Depeyrot 1992, p. 39; Jungck 1976, p. 27.

[29] Roueché & Reynolds 1989, p. 264; HENDY 1985, p. 457.

[30] Böhnke 1994, p. 478.

[31] Cope 1977A, p. 225–226.

[32] Roueché & Reynolds 1989, p. 264.

[33] Strobel 2015, p. 166, note 35.

[34] Găzdac 2010, p. 107.

[35] Callu 1969, pp. 391, 389.

[36] Posner 2015, p. 7; Cope 1977A, p. 224.

Also, a nearly pure silver coin with a moderate premium (as compared to the *nummus*) over the intrinsic value was a likely candidate for demonetization in this inflationary economy. It seems highly improbable that a product with a price of 100 *dc* would in practice have been bought using an *argenteus* when four *nummi* would also have concluded the transaction. We can safely assume that no one would part with an *argenteus* for four *nummi*<sup>[37]</sup>. The time had not yet come for the introduction of a nearly pure silver coin, as many generations had never encountered one. The *argenteus* was probably seen as a valuable object, not as currency with actual payment function.

To summarize: the *argenteus* was produced in limited quantities and did not form a part of general circulation. Still, we included the coin – not without hesitation – in table 1, our proposal for a new currency scheme. We assume a pre-301 value of 100 *dc* and not the often proposed 50 *dc*, as this nominal value at introduction in 294 is not very plausible.

## 7. Nummus



Fig. 3 – Nummus for Galerius, Carthago mint  
(RIC VI 32b)

The Roman Empire did not produce coins for ‘the market’: coins were produced to pay the armies<sup>[38]</sup>. The *nummus* (fig. 3) was probably introduced with the three-monthly regular soldier’s pay, the *stipendia* in mind. It was the quintessential soldier’s coin. We see large scale production during the preparation of the British campaign; when Constantius had ended Allectus’ Romano-British realm, production levelled off again<sup>[39]</sup>. The coin had a substantial nominal value. Many daily maximum wages in the Edict of Maximum Prices were 1 *nummus* or a multiple thereof. The *nummus* carried enough purchasing power to feed a family for a day<sup>[40]</sup>. The focal point of the Currency Revaluation inscription of Aphrodisias was in all probability the *nummus*<sup>[41]</sup> as the *aureus* and the *argenteus* de facto played no role in circulation, as by 301 must have been clear.

[37] Strobel 2015, p. 164.

[38] Aarts 2000, p. 41, 209; Casey 1986, p. 82; Willems 1984, p. 258.

[39] Depeyrot 1992, p. 42.

[40] *Ibid.*, p. 44.

[41] Roueché & Reynolds 1989, p. 264; Hendy 1985, p. 457.

The nominal value before and after 1 September 301 is now generally accepted to have been 12 ½ and 25 *dc* respectively. The revaluation was probably decided on to protect the purchasing power of the soldier's wages and pensions and to give the treasury an increased margin between production costs and face value of the *nummus* <sup>[42]</sup>.

There has been some reluctance <sup>[43]</sup> to accept the reconstruction of line 1 and 2 of the second block of the Currency Revaluation inscription from Aphrodisias as [...*nummus vigin*]ti *quinquae* (sic!) *den*[ari]orum... <sup>[44]</sup> as the consequential pre-revaluation value of 12 ½ *dc* seemed problematic. The documented devaluation of the *nummus* in the East from 25 to 12 ½ *dc* by Licinius in 317 and the 12 ½ *dc* value alluded to in the papyri P. Ryl. 4. 607 <sup>[45]</sup>, PSI VIII 965 and P. Osl. 83. Z.12 <sup>[46]</sup> and P. Panop. 2 <sup>[47]</sup> are now considered sufficient support for an initial nominal value of 12 ½ *dc* <sup>[48]</sup>.

As a matter of fact, the *nummus* was the all-purpose coin of the tetrarchic currency system. As *aurei* and *argentei* were not available or not sufficiently available and as private banking had stopped during the second half of 3<sup>rd</sup> century, not to reappear until ca. 330-340 <sup>[49]</sup> large payments had to be made in *nummi*. To facilitate such transactions, *nummi* were apparently packed in sealed bags with a standardized content <sup>[50]</sup>. Sealed purses of silver or gold coins (*secculum signatum* and *pecunia obsignata*) were known to 3<sup>rd</sup>-century jurists <sup>[51]</sup> and are also reported from the 4<sup>th</sup> century. At first these 4<sup>th</sup>-century bags were understood also to have contained gold and silver coins, but a more plausible hypothesis proposes a content of *nummi* for this period <sup>[52]</sup>. This hypothesis is supported by the iconography of the 4<sup>th</sup>-century purses, represented in mosaics. Purses with the text  $\overline{\text{XXII}} \bar{\text{d}}$  or 12,500 *denarii* are known from the villa at the Piazza Armerina (fig. 4) in Sicily <sup>[53]</sup> and from Cherchell in North-Africa <sup>[54]</sup>. From Talh (North-Africa) we know a purse labeled  $\overline{\text{XXV}}$ , or 25,000 *denarii* <sup>[55]</sup>.

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<sup>[42]</sup> Böhnke 1994, p. 477-478.

<sup>[43]</sup> Erim, Reynolds & Crawford 1971, p. 175.

<sup>[44]</sup> Strobel 2015, p. 170.

<sup>[45]</sup> Abdy 2012, p. 591-592.

<sup>[46]</sup> Jungck 1976, p. 30; Strobel 2015, p. 154-155.

<sup>[47]</sup> Brandt 1988, p. 27.

<sup>[48]</sup> Roueché & Reynolds 1989, p. 263.

<sup>[49]</sup> Andreau 1999, p. 33; Temin 2013, p. 189.

<sup>[50]</sup> van Heesch 2006, p. 60.

<sup>[51]</sup> Hendy 1985, p. 339.

<sup>[52]</sup> Jones 1959, p. 34; Depeyrot 1992, p. 48-49.

<sup>[53]</sup> Jones 1959, p. 34; Hendy 1985, p. 339.

<sup>[54]</sup> Callu 1969, pp. 363, 365, note 1.

<sup>[55]</sup> Khanoussi 1988, pp. 551, 559-560.



Fig. 4 – Detail of the mosaic in the villa at the Piazza Armerina, Sicily

We should however be aware of some limitations. The iconographic data came only from mosaics with a representation of athletic contests and no other context is known. Also, the purses are not yet archaeologically attested.

We know that the *nummus* had a nominal value of 12 ½ *dc* until 1 September 301, and of 25 *dc* from then on. We can accept the iconography-based hypothesis that the standard sealed bags contained 1,000 *nummi*.

### 8. Radiate fractals

The coin reform of Diocletian in 294 introduced two base metal (copper) fractals, a radiate and a smaller laureate coin. We will discuss the latter coin in the next paragraph.



Fig. 5 – Aurelianus for Diocletian, Antioch mint  
(RIC V-II 322)

Before 294, the radiate *aurelianianus* was struck for the members of the tetrarchy, in fact an *antoninianus* of improved size and weight, argentiferous and with a better, more durable silver wash (fig. 5). The coin was introduced by Aurelian as part of his 274 coin reform and was continued by his successors to the throne. Production ceased in 294, but the coins continued to circulate.



Fig. 6 – Post-294 radiate fractal for Maximian, Alexandria mint  
(RIC VI 46b)

The new radiate fractal (fig. 6) shares the obverse type and some of the reverse types with the *aurelianianus* but did not carry the mark XXI (or KA) in the reverse exergue like many of the latter coins. The new coin weighed ca. 3 g, the *aurelianianus* ca. 3.9 g, and silver was not intentionally added to the alloy of the new radiate fractal, as was done in case of the *aureliani*, which coins furthermore had a silver wash.

The radiate fractals were produced in large quantities between 294 and 300 at the mints of Ticinum, Rome, Siscia, Heraclea, Cyzicus, Antiochia and Alexandria<sup>[56]</sup>. The coins were not produced at the western mints (London, Treves and Lyon). The reason for this will be discussed later.

Seven of the proposed currency schemes (see table 1) include both the *aurelianianus* and the copper radiate fractal, five with a different nominal value and two with the same nominal value.

The coexistence of both coin types in circulation presents a problem. The (slightly) argentiferous *aurelianianus* had an intrinsic value of 3.14 *dc*, based on the metal prices from the Edict on Maximum Prices. The copper radiate fractal had an intrinsic value of 0.6 *dc*<sup>[57]</sup>. The Roman public was very sensitive to variances in intrinsic values, as the hoarding process of especially the 3<sup>rd</sup> century has shown. When both coin types were circulated at the same nominal value, the ‘bad’ copper fractals could possibly, conform to Gresham’s Law, drive the ‘good’ *aureliani* with their silver wash from circulation.

However, circulating the two quite similar coin types with a different face value (for instance 4 *dc* for the *aurelianianus* and 2 *dc* for the copper radiate fractal as has been proposed) would have caused mistakes, discussions and even deliberate cheating in the marketplace when the similarities

[56] Sutherland 1967.

[57] Cf. Cope 1977A, p. 225-226.

between the copper radiate fractals and the *aureliani* had become striking, which would be the case once the latter coins had lost their silver wash during circulation.

We will show that this problem existed in the eastern, not in the western empire, because the copper radiate fractal was typically a coin of the East<sup>[58]</sup>.

The radiate fractals were not hoarded, but are found as stray coins in site finds. Callu reported only 16 of these coins from western sites, from Italy only 17, while Africa produced 91 radiates. The Balkans, Asia Minor and the eastern provinces yielded hundreds of copper radiate fractals, illustrating their importance in eastern circulation<sup>[59]</sup>.

In the western provinces, we see a deviation from the coin circulation in all other provinces. Normally, emissions and even coin types waxed and waned in the circulation of the whole Roman Empire. But western circulation began to diverge after the rebellion of Postumus in 260, which resulted in a separate Gallo-Roman Empire consisting of Britain, Gaul, Spain and the Rhine provinces.

The Gallo-Roman rulers produced their own coins while few post-260 *antoniniani* for the legitimate rulers Gallienus and Claudius II entered western circulation. After the defeat of the last of these rulers (Tetricus father and son) by Aurelian in 274, the new *aureliani* did not enter the coin circulation of the western provinces. Instead, *antoniniani* minted for Gallienus and Claudius II were belatedly supplied to the West, not to reach their zenith there before the end of the seventies and in the eighties of the 3<sup>rd</sup> century<sup>[60]</sup>.

The *aureliani* were probably withheld from the West by the authorities, fearing that this well-produced argentiferous coins with their silver wash would immediately have been hoarded after their introduction into the much debased western coin pool<sup>[61]</sup>.

In 274-276, this western coin pool consisted for the most part of the debased *antoninianus* emissions for the last usurpers Tetricus I and II which were carelessly produced and contained less than 1% of silver, and of the degenerate local copies ('barbarous radiates') which contained no silver at all. A smaller share (ca. 20%) was formed by the *antoniniani* for Gallienus and Claudius II<sup>[62]</sup>.

The western coin pool stagnated and differed from the central and eastern circulation for many decades. In many western hoards of ca. 300 we find *nummi*, but also many *antoniniani* produced before 274 and few post-274 *aureliani*. In the central provinces the *aureliani* accompanied the

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[58] Callu 1969, pp. 389, 393.

[59] *Ibid.*, p. 392.

[60] Kropff & van der Vin 2003, p. 59; van Heesch 1998, p. 139.

[61] Kropff 2005, p. 85.

[62] Kropff 2005; King 1981.

*nummi*, as they did in the eastern provinces and in Africa, in which areas the copper radiate fractal was also an important component in circulation<sup>[63]</sup>. We noted that the post-294 radiate fractals were not produced at the western mints and now we see the reason: these coins would have been superfluous in the West, where Gallienus/Claudius II emissions dominated circulation until the first decade of the 4<sup>th</sup> century<sup>[64]</sup>.

Having completed our analysis of the divergences between eastern and western radiate circulation, we will now focus on the nominal value of all radiates in circulation in both parts of the Empire after 1 September 301. Quite a few currency schemes (see table 1) propose a value of 2 *dc* for the copper radiate fractal and a 4 *dc* (or even 5 *dc*) value for the *aurelianianus*. The Edict on Maximum Prices indeed seems to make a strong case for a 4 *dc* coin value, as we find 196 items with a maximum price of 4 *dc* and also many prices of 8, 12, and 16 *dc*<sup>[65]</sup>. Also, 4 *dc* is quite often the maximum price for batches of 2, 5, 10, 20 or even 100 units of a product, which in itself does not suggest a 2 *dc* coin.

Nevertheless, in the Price Edict we find 26 items with a maximum price of 2 *dc*, and also prices apparently requiring a 2 *dc* coin once a 4 *dc* coin is acknowledged (6, 10, 14, 18, 22 *dc*, etc.). The majority of the in total 109 prices of 2 *dc* or 2 *dc* coin dependent prices up to and including 30 *dc* are prices of account, not transaction prices<sup>[66]</sup>. A sheep shearer would not have been hired for just one sheep (2 *dc*), nor would a maker of brick be summoned to prepare and fire four bricks (2 *dc*). In the higher price ranges, for instance 18 and 22 *dc*, all prices are transaction prices: sea freight charges for the transport of one *kastrensis modius* (17.51  $\ell$ ) between two sea ports.

All in all, we can acknowledge that the Edict on Maximum Prices makes a strong case for a 4 *dc* coin, not for a 2 *dc* coin. The hypothesis stating a 4 *dc* face value for the *aurelianianus* and a 2 *dc* face value for Diocletian's copper radiate fractal, which we already have disputed from the point of view of problem-free transactions and circulation, can now also be rejected after analyzing the evidential value of the Price Edict.

We conclude that both the *aurelianianus* and the copper radiate circulated at a nominal value of 4 *dc*. The copper radiate would in this hypothesis theoretically drive out the *aureliani* on account of the higher intrinsic value of the latter coin and this is indeed what happened. This is demonstrated by the eastern hoards, showing that the coins initially coexisted in circulation but by 307 the *aureliani* had disappeared from the hoards of for instance Aleppo, Homs, Cairo II and Lebanon<sup>[67]</sup>.

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[63] Callu 1969, p. 390-392.

[64] Estiot 2012, p. 545; Lafaurie 1975, annexe III.

[65] Cope 1977B, p. 10-11; Lafaurie 1975, annexe II.

[66] Jungck 1976, p. 31.

[67] Bruun 1981, pp. 358, 362-363.

We do not know whether or not the Edict on Maximum Prices was implemented in the West, were no fragments of the edict were found and radiate circulation had diverged. If it was, the *antoniniani* produced before 274 could theoretically have circulated at a 4 *dc* value after 1 September 301, as *aurelianiani* and copper radiate fractals were virtually absent in the West.

### 9. Laureate fractal, the *denarius communis*?



Fig. 7 – Laureate fractal for Diocletian, Rome mint  
(RIC VI 48 var.)

A small copper laureate fractal (256 to the *lb*, ca. 1.27 g) with the reverse *utilitas publica* (fig. 7) was produced in apparently very small quantities in Ticinum, Rome and Siscia<sup>[68]</sup>. The coin has been identified as a 1 *dc* coin<sup>[69]</sup>, and as such was included in eight of the proposed currency schemes, five schemes attribute a 2 *dc* nominal value to the coin, see table 1.

However, it seems quite unlikely that this coin ever formed a part of the coin circulation due to the small scale production at only a few mints. The possibility that the small laureate had no face value and might not have circulated has been recognized<sup>[70]</sup>; Bastien proposed a role in imperial distributions<sup>[71]</sup>. Also, a commemorative function has been proposed<sup>[72]</sup>.

The Edict on Maximum Prices as a rule avoids maximum prices requiring the use of a 1 *dc* coin<sup>[73]</sup>. We come across a handful of exceptions and most of them can be explained without resorting to a 1 *dc* coin.

Some of the prices are clearly prices of account because the items are bought in a more realistic quantity. For instance: 6 *lb* (ca. 2 kg) of green fodder would not feed a horse<sup>[74]</sup>. The other 1 *dc* price is a freight tariff for one *modius* (8.75 *ℓ*) downriver<sup>[75]</sup>. Other prices apparently requiring a 1 *dc* coin should also be considered as prices of account, for instance Judean green glass at 13 *dc* a *lb*.

[68] Sutherland 1967.

[69] Cope 1977B, p. 7-8; Callu 1969, p. 370.

[70] Depeyrot 1992, p. 45-46.

[71] Bastien 1980, p. 81.

[72] Depeyrot 1992, p. 46.

[73] Corcoran 2000<sup>2</sup>, p. 229.

[74] Lauffer 1971, 17.8.

[75] *Ibid.*, 37.73.

The Edict on Maximum Prices should be used with caution to argue a coin value. As observed before, the edict only makes a strong case for a 25 *dc nummus* and a 4 *dc radiate*.

The function of the small radiate is still unclear. We would suggest that a short and limited emission of a *denarius* coin was started, but very soon abandoned because inflation had made the coin redundant in circulation. We have not included the coin in our proposed currency scheme.

## 10. A new currency scheme

In table 1 a new currency scheme (Kropff 2017) is proposed. The *aureus* is not included because at the time the coin functioned as gold bullion and did not circulate. To include the coin with a value equal to the maximum bullion price from the Edict on Maximum Prices would suggest a payment function, which the coin no longer had. It would also suggest interchangeability, but the Augustean system of mutual interchangeability of different denominations no longer existed in 301. Twelve *argentei* or 48 *nummi* would not have 'bought' an *aureus*. The currency system no longer had a gold coverage<sup>[76]</sup> and the public trust which Diocletian tried to restore with the 294 coin reform, by the end of the 3<sup>rd</sup> century probably would have been diminished.

We have included the *argenteus* in the currency scheme, although we doubt whether four *nummi* would have 'bought' the silver coin. We should probably conclude that the *argenteus* was scarce and hardly formed a part of regular circulation. The *argenteus* barely left a trace in hoards and is rather scarce as a site find in many areas.

Diocletian's currency scheme, designed to be trimetallic, was in reality a monometallic system, based on the slightly argentiferous *nummus* (25 *dc*) and on the radiate fractal, and for a time on the old but initially still circulating *aureliani* (both 4 *dc*), which coins were included in the proposed currency scheme.

In the West, the old *antoniniani* fulfilled the role of fractal adjunct to the omnipresent *nummus* and we should consider the possibility that, if Currency Revaluation and Edict on Maximum Prices were applicable in the West, this coin might have had a face value of 4 *dc* after 1 September 301, equal to that of the virtually absent *aureliani* and copper radiate fractals (4 *dc*). The small copper laureate is not included, as it never circulated.

The *nummus* was in fact the pivot of the tetrarchic currency system and it circulated in the entire Roman Empire. As neither *aureus* nor *argenteus* were in fact available for payments, *folles* or sealed and standardized bags of *nummi* were probably used for large payments.

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<sup>[76]</sup> Strobel 2015, p. 164-165.

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