COUNTERFEITING ROMAN COINS IN THE ROMAN EMPIRE 1ST–3RD A.D. STUDY ON THE ROMAN PROVINCES OF DACIA AND PANNONIA

Răzvan Bogdan Gaspar

University Babeș-Bolyai of Cluj-Napoca
gaspar.razvan.bogdan@gmail.com

Abstract: This paper is based on the study of Roman silver coins, from archaeological sites located in Roman Dacia and Pannonia. Initially centered on the record of hybrid silver coins, the paper expanded its analysis on counterfeit pieces as well in order to fully understand all problems of Roman silver coinage from the 1st to the 3rd centuries AD.

The new and larger area of research had more than one implications, coin distribution on the studied sites, influx of coin in the province, quantity of recorded counterfeited pieces being just some of them. Thus every situation was discussed in different chapters, first presenting the coins and the laws that protected them, the studied sites and the analyse of the silver coins on these sites, the general and compared situation between the provinces, interpretation of the counterfeited and hybrid pieces and finally, conclusions on the subject.

All these tasks have been achieved one step at a time, each archaeological site providing precious data which piled up and was finally pressed in order to present the correct historical situation.

Keywords: Roman Empire, Dacia, Pannonia, archaeological sites, silver, coins, counterfeiting, hybrid, graphs, coefficient;

INTRODUCTION:

The area which enters this study was geographically delimited to the Roman provinces of Pannonia Inferior, Pannonia Superior, Dacia Porolissensis and Dacia Apulensis. This bordering was chosen because it offers the possibility to compare different archaeological sites from Dacia and Pannonia between them, at the end trying to compare the results from Pannonia with those coming from Dacia in order to observe the distribution of counterfeited pieces.

As a chronological period, all of the silver coins, denarius and antoninianus, from Augustus (27 BC - AD 14) to Philip I (AD 244-249) were studied. This period was selected because it represents the transformation of Pannonia in a Roman province (AD 9) and until the end of a regular flow of coin towards the province of Dacia. In the same time, the last historical period is marked by Philip I (244-249) and his reign. This time frame is very representative for the Roman Empire as it holds the "Golden Age" as well as the beginning of the "Downfall".

For this study the following sites were chosen, military as well as civilian sites such as Porolissum, Buciumi, Samum, Arcobadara, Potaissa, Apulum, Ulpia Traiana Sarmizegetusa from the Roman province of Dacia and the sites of Intercisa, Gorsium-Herculia, Solva, Brigetio, Ad Mures, Arrabona,

Mursella, Scarbantia, Carnuntum for the Roman province of Pannonia.

After looking at the discovered coin catalogues belonging to all the sites, graphs were made to represent in a more efficient manner the number of silver coins from the catalogues. The information that was introduced in the graphs was the result of simple mathematical formula adapted from the Ravetz[1] formula which takes in consideration the number of coins and the reign of the emperor. This way, we can easily observe the distribution of coins on the studied sites and in the two provinces.

All silver coins, denarius and antoninianus, from the 1st to the 3rd centuries AD, more exactly for the period from Augustus (27 BC- AD 14) to Philip I (AD 244-249)[2] have been taken into account.

The Ravetz[3] formula was extended, so that it may be useful, depending on the situation. Therefore, when trying to calculate the index for coins on just one site we use the next formula:

$$\frac{coins\ per\ issuer}{years\ of\ reign} \times \frac{1000}{total\ number\ of\ coins}$$

In the case of finding the coefficient of coins for the scale of the entire province, the formula was slightly changed in:

$$\frac{coins\ per\ issuer\ from\ all\ sites}{years\ of\ reign} \times \frac{1000}{total\ number\ of\ coins\ from\ all\ sites}$$

This way the correct representation for silver coin distribution, genuine and counterfeited, on archaeological sites and the two Roman provinces, is possible regardless the fact that some sites have larger quantities of discovered pieces.

SHORT HISTORY OF ROMAN SILVER COIN:

In order to carry on the study, a brief introduction in the history of the Roman coins and the laws that were trying to protect them is necessary. The first denarius was minted by Rome between the years 214 and 211 BC[4] during the Second Punic War[5] because of the need for many military units.

Denarius used to represent up to 35% of the total coin denomination discovered in the Roman provinces from middle and lower Danube until the period of Septimius Severus (193-211)[6] .This was the type of coin used in an economic environment thus being preferred to horde[7].

In AD 215 emperor Caracalla (211-217) issues a brand new silver coin[8], a double denarius conventional named as antoninianus. This piece was officially priced as 2 denarii[9] yet in short time the drop in weight to just 2,5 grams of silver content showed that it only had enough silver for one and a half denarius. The antoninianus has a lower proportion at the beginning of the 3rd century AD. in comparison to the denarius, yet at the end of the century it completely replaces the denarius.

The presence of Roman denarii from the Republic period and 1st century AD. in Dacia can be explained in more than one way. First of all, after the monetary reform undertaken by Trajan (98-117) in 107, Rome melts old denarii so that it may mint new one with less silver[10] in them, thus the local population tries to hold on to older coins.

Also, the republican denarii were the most minted coins from the Roman Republic[11] being used in circulation and imitated in many forms in pre-Roman Dacia[12].

One of the best initiatives made by the most *equal amongst equals* was to keep the minting of silver and gold coins in the hands of imperial authority[13]. This way Augustus (27 BC – AD 14) could issue coins made of precious metal and keep a vital control over the Roman Army.

During the time of Trajan (98-117), a reduction in the quantity of silver takes place[14] from about 900‰ to about 800‰[15], followed by the period of Hadrian (117-138) when the majority of the denarii show the base silver as being between 840‰ and 800‰[16] and going on, under Antoninus Pius (138-161) reaching values between 790‰ and 700‰[17].

A sudden drop of the silver content for the denarius takes place, some historians considering it as happening during Commodus (180-192) when the weight of the coin goes down by 0,5 grams and the quantity of silver from 730‰ to 661‰[18], while others place it later at Septimius Severus (193-211) when denarius coins show silver content from 750‰ to about 550‰[19].

Thus, the quantity of precious metal found in a silver coin will drop even more passing the limit of 50% and becoming a billion[20].

ROMAN LAWS ON COINAGE:

Counterfeiting money is the act of imitating and illegally producing coins with the intention of unloading them inside the monetary circulation system or for personal enrichment. Trying to fight back the possibility that some individuals might attain wealth throw forgery, laws were implemented even from the time of the Roman Republic to punish these actions.

The first law against counterfeited coinage was in the *edictum cum poena et iudicio* of Marius Gratidianus from about 84 BC[21] but which did not survive until today. Thus, the basis of Roman law concerning counterfeiting is considered to be

1 CASEY 1974, 41.
2 This study ends at the time of Philip I because after his reign, the quantity of silver from coins reached such a low value that is hardly any difference between genuine and counterfeit pieces in terms of silver content, the latter ones become practically worthless.
3 CASEY 1974, 41.
4 AMANDRY 2001, 159.
5 DEPEYROT 2006, 13.
6 GĂZDAC 2002, 176.
7 GĂZDAC 2002, 176.
8 AMANDRY 2001, 23.
9 HOWGEGO 2005, 127
10 CRAWFORD 1978, 152. HARL 1996, 92-93.
11 BURNETT 1987, 36.
12 CRAWFORD 1980, 51-52. LOCKYEAR 1995, 85-102.
13 DUDĂU 2004, 6.
14 CASSIUS DIO, 308.
15 KIRIȚESCU 1997, 46. BOLIN 1958, 208-211.
16 DUDĂU 2006, 10.
17 KIRIȚESCU 1997, 46-47. BOLIN 1958, 210-212.
18 CALLU 1969, 244, 476.
19 DEPEYROT 2006, 126.
20 AMANDRY 2001, 68.
21 MOMMSEN 1870, 82-84.

lex Cornelia de falsis from 81 BC, also known as *Lex Cornelia testamentaria nummaria*[22].

Part from the text of the law survived until now, being quoted in the *Digestae*: "*Legea Cornelia cavetur, ut, qui in aurum vitii quid addiderit, qui argenteos nummos adulterinos flaverit, falsi crimine teneri. Eadem poena adificitur etiam is qui, cum prohibere tale quid posset, non prohibuit*"[23].

From the remaining passage it can be seen that any attempt to counterfeit a silver coin was considered as a crime. Also the usage of tin or lead made coins which were mistaken for silver was prohibited[24].

The punishment for counterfeiting silver coinage are described in the *Institutiones*[25], "*...Legis poena in servos ultimum supplicium est, quod et in lege de sicariis et veneficis servatur, liberos vero deportatio*"[26], thus, slaves were sentenced to death while free men were banished.

During the time of the Principate, the historical sources that bring information about the content of *Lex Cornelia* can be found in the letters from emperors to provincial governors. The most detailed account of these sources is Paul's *Sententiae*, dated to the 3rd century AD, which reflects the main practice for the Antonine period[27]. "*Lege Cornelia [...] qui nummos aureos argenteos adultaverit, lavaverit, conflaverit, raserit, corruperit, vitiaverit, vultuque principum signatam monetam, praeter adulterinam, reprobaverit: honestiores quidem in insulam depotantur, humiliores autem aut in metallum dantur aut in crucem tolluntur; servi autem postve manumissi capite puniuntur.*"[28].

The law was extended in order to cover both silver and gold coins. Further on, all of the possible methods of abusing coinage are presented in detail. Thus, being found guilty of counterfeiting, melting, clipping, washing or injuring any silver coin would have brought you banishment, lifetime work in the mines, crucifixion or capital punishment depending on the social status of the convicted one.

All of these measures could take place when trying to abuse the silver coin. In the case of illegal actions made on gold coins, the sinner would have been thrown to wild beasts in the amphitheatre while slaves were tortured to death: "*Quicumque nummos aureos partim raserint, partim tinxerint vel finxerint: si quidem liberi sunt, ad bestias dari, si servi, summo supplicio adfici debent.*"[29].

Lacking in any legislation against counterfeiting bronze coins can be explained because of the lack in value of these pieces and because these coins were issued by the Senate[30].

The analyses made on numismatic material from different sites from Dacia record the presence of ancient imitations and copies like cast coins, plated pieces, hybrids or "*barbarous*" types[31]. This image is not seen only in the case of Roman Dacia, a similar pattern being present all along the Roman Empire[32].

MONETARY SITUATION ON THE STUDIED SITES:

The first and most important civil settlement from Roman Dacia was ***Ulpia Traiana Sarmizegetusa* (Sarmizegetusa, Romania)**, founded in south-western Dacia soon after the Second Dacian War (AD 105-106). With the help of epigraphical inscriptions discovered here it was possible to date the founding of the Roman *colonia* at AD 106[33] with the full name of *colonia Ulpia Traiana Augusta Dacica Sarmizegetusa*.

It represented an important economic centre because of its location on commercial roads and close by farming area. During the Marcomannic Wars (AD 166-180) the town was attacked and the area outside the walled city was burned and destroyed[34]. After the danger had passed, o period of rebuilding and prosperity followed under the Severan period[35] that continued well under Filip I (244-249)[36].

As we can see in (Fig. 1), on the archaeological site of *Ulpia Traiana Sarmizegetusa* there have been found 230 genuine coins which make up 81% of the total amount of pieces, 51 counterfeited coins that represent 18% and four hybrid pieces with 1%.

It is easy to observe how the genuine pieces from (Fig. 2) out past the number of counterfeit pieces for the Antonine and Severan period. With the start of the Anarchy period in AD 235, the counterfeited pieces rise in quantity.

For a better representation of the distribution of coins on this site, a third graph is needed (Fig. 3), which was made with the help of the Ravetz[37] formula.

Founded at the end of the Second Dacian War (105-106), **Apulum (Alba Iulia, Romania)** represented from the beginning an important military and economical centre serving as the garrison for Legion XIII Gemini.

During Septimius Severus (193-211), the civil settlement from the south of the legionary fortress becomes *municipium Septimium Apulensis* and at the year 250 even the rang of *colonia* as *colonia nova Apulensis*. The *canabe* from the north and west of the fortress remain in use even in the 3rd century[38].

Close by at 2-3 km a new settlement was established, today area known as "Partoş". Under Marcus Aurelius (161-180) the settlement receives the title of *municipium* becoming *municipium Aurelium Apulum*, later during the period of Commodus (180-192) gaining the rang of *colonia* under the name *colonia Aurelia Apulensis*[39].

The graph with silver coins discovered on the site from Apulum (Fig. 4), shows the existence of 346 genuine pieces with a proportion of 55%, 269 counterfeited coins with 43% and 13 plated hybrids with 2%.

Distributing the coins on the period of reign for each issuer (Fig. 5), shows how the number of counterfeited

22 CICERO, 42. GRIERSON 1956, 242.
23 DIGEST, 9.
24 GĂZDAC/ALFÖLDY-GĂZDAC 2001, 139.
25 GĂZDAC/ALFÖLDY-GĂZDAC 2001, 139.
26 INSTITUTIONES, 7-8.
27 GRIERSON 1956, 243.
28 PAULUS, 1.
29 DIGEST, 8.
30 GRIERSON, 245.
31 GĂZDAC/ALFÖLDY-GĂZDAC 2001, 140.
32 GĂZDAC/ALFÖLDY-GĂZDAC 2001, 140.
33 PISO 2001, 17.
34 DAICOVICIU/PISO 1975, 159-160. DAICOVICIU/PISO 1977, 155-156.
35 PISO 1993, 82-86.
36 DAICOVICIU/ALICU 1984, 34-35.
37 CASEY 1974, 41.
38 GĂZDAC/SUCIU/ ALFÖLDY-GĂZDAC 2009, 2.
39 GĂZDAC/SUCIU/ ALFÖLDY-GĂZDAC 2009, 2.

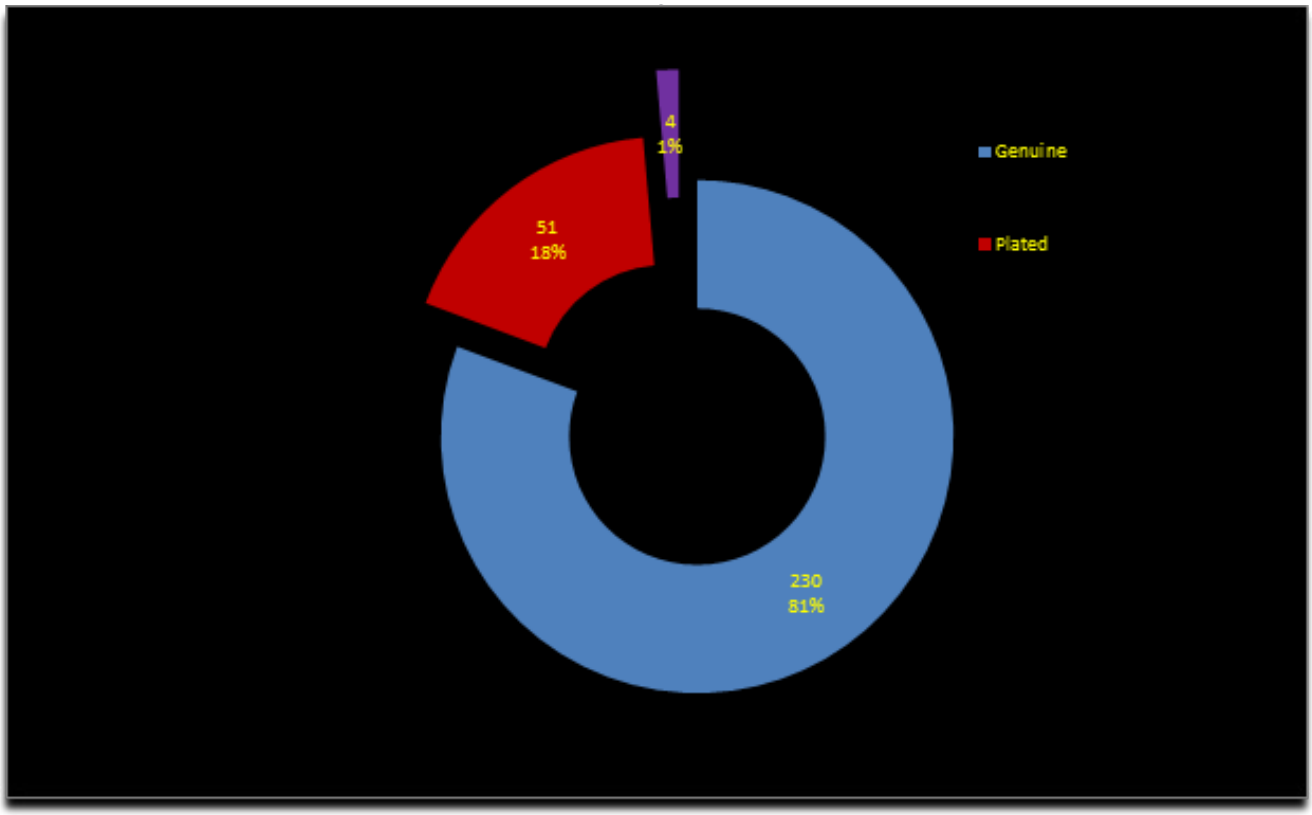


Fig. 1 – Graph of the silver coins from Ulpia Traiana Sarmizegetusa – number of coins and their proportion on the site;

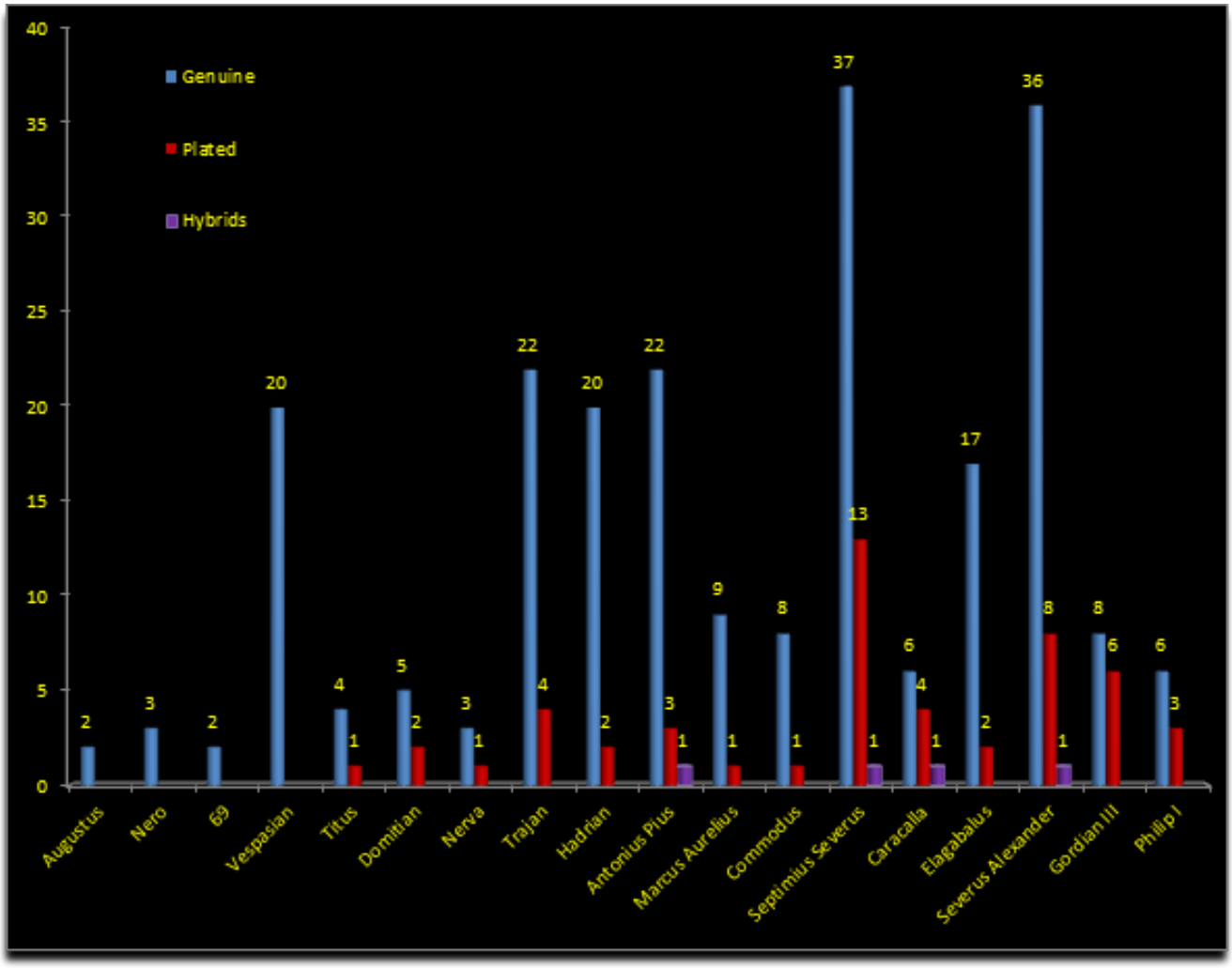


Fig. 2 – Graph of the silver coins from Ulpia Traiana Sarmizegetusa – number of pieces for each issuer;

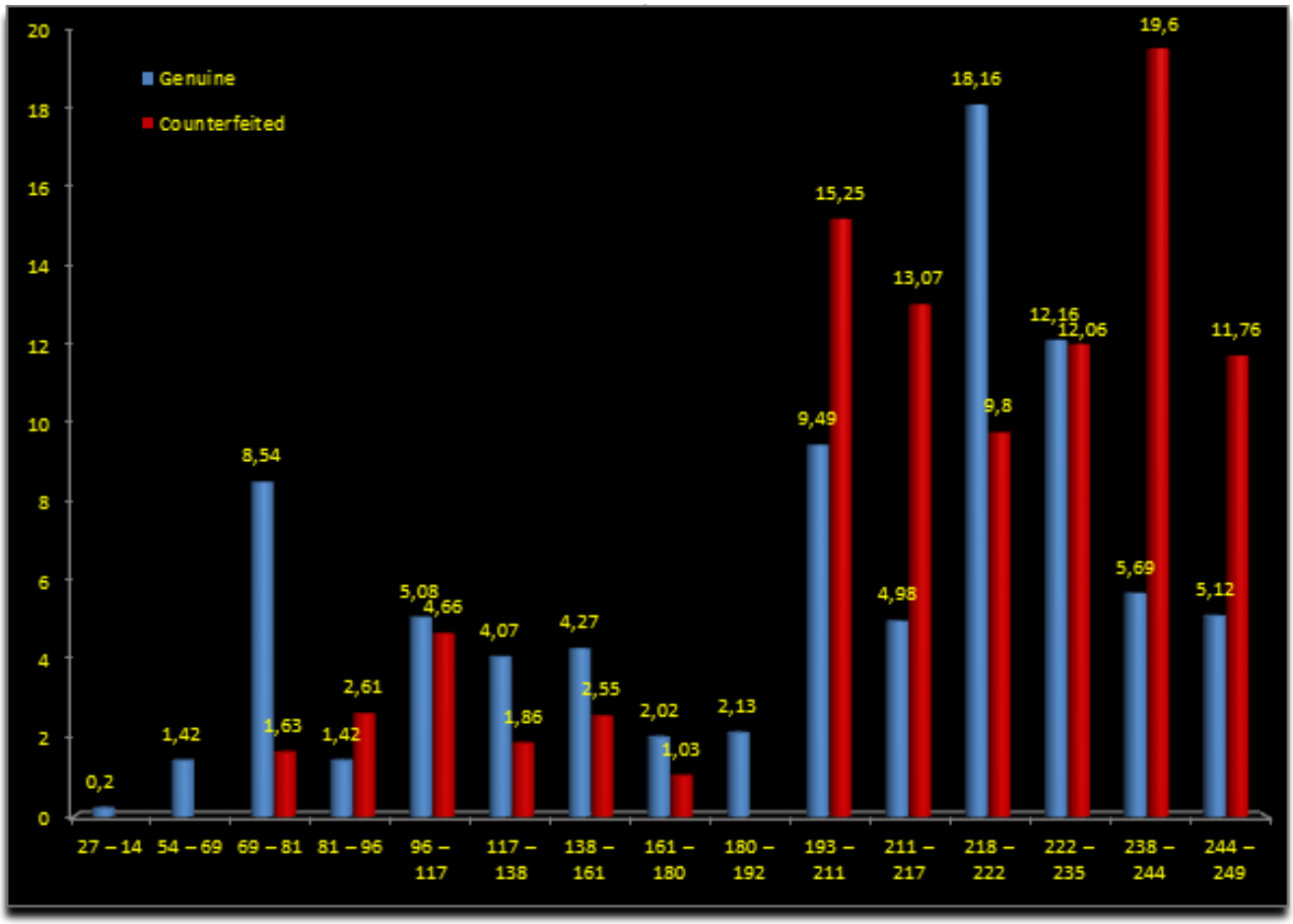


Fig. 3 – Graph of the silver coins from Ulpia Traiana Sarmizegetusa – monetary index;

pieces is almost equal with the number of genuine ones for the period of Trajan (98-117), Septimius Severus (193-211), Elagabalus (218-222), Severus Alexander (222-235), Gordian III (238-244), is twice as higher than the number of genuine ones for the time of Caracalla (211-217) and Maximinus Thrax (235-238) or is equal to half of the number of genuine coins dated at Hadrian (117-138), Antonius Pius (138-161), Marcus Aurelius (161-180).

On the other hand (Fig. 6), represents a new perspective of the situation. If during the Antoninians the coefficient of counterfeited coins is equal to that of genuine ones, during the Severan period the index for genuine ones is surpassed by the counterfeited pieces, high values for both types of coins being present in this period of time, the highest value identified under Elagabalus (218-222). The high coefficient of counterfeited pieces continues even after the Severan period, into the beginning of Military Anarchy.

The first epigraphical mention of **Potaissa (Turda, Romania)** comes from a *miliarium* dated to AD 108[40]. In this location, Roman military personnel have been brought, therefor until now there have been identified auxiliary troops as *cohors I Flavia Ulpia Hispanorum miliaria civium Romanorum equitata, cohors I Batavorum miliaria* and some detachments from Legion XIII Gemini, all of them being testified with the help of stamped bricks[41].

In the time of the Marcomannic Wars the V Macedonia Legion was brought to Potaissa to raise the military power of Roman Dacia. The establishment of the Legion at Potaissa in the years 168 – 169[42] meant the rapid development of the region, during the next century[43] the local economy of Potaissa receives an influx of coin which is most visible under the Severan period.

Barbarian attacks from the time of Philip I (244-249) left their mark on the town, parts of the legionary fortress being reconstructed, yet the settlement overcame the dangers. The biggest blown to the settlement came during Gallienus (268-270) or Aurelianus (270-275) when the legion was recalled back to defend other corners of the Empire.

The graph that was made after the discoveries from Potaissa, shown in (Fig. 7), the presence of 773 genuine pieces that form up to 84% from the total number of coins, 90 plated coins with 10%, 12 cast pieces with 1%, 20 plated hybrids with 2% and 23 hybrids representing 3%.

Next graph was made using the number of coins and years of reigning for each issuer (Fig. 8), and it shows how genuine coins are present in higher numbers for all the issuers. From Domitian (81-96) to Philip I (244-249), with the exception of Commodus (180-192), counterfeited coins, whether they are plated, casted or plated hybrids, alongside hybrid pieces, are seen in small numbers at all the issuers.

However, after using the Ravetz[44] formula we can see the new results in (Fig. 9).Not only did the index for counterfeited pieces is equal in value with the one for

[40] WINKLER 1982, 80-84. BĂRBULESCU 1994, 3. FODOREAN 2006, 64-68.
[41] BĂRBULESCU 1987, 36-37. NEMETI 1999, 194-195. PÎSLARU 2009, 24.
[42] BĂRBULESCU 1987.
[43] PÎSLARU 2009, 25.
[44] CASEY 1974, 41.

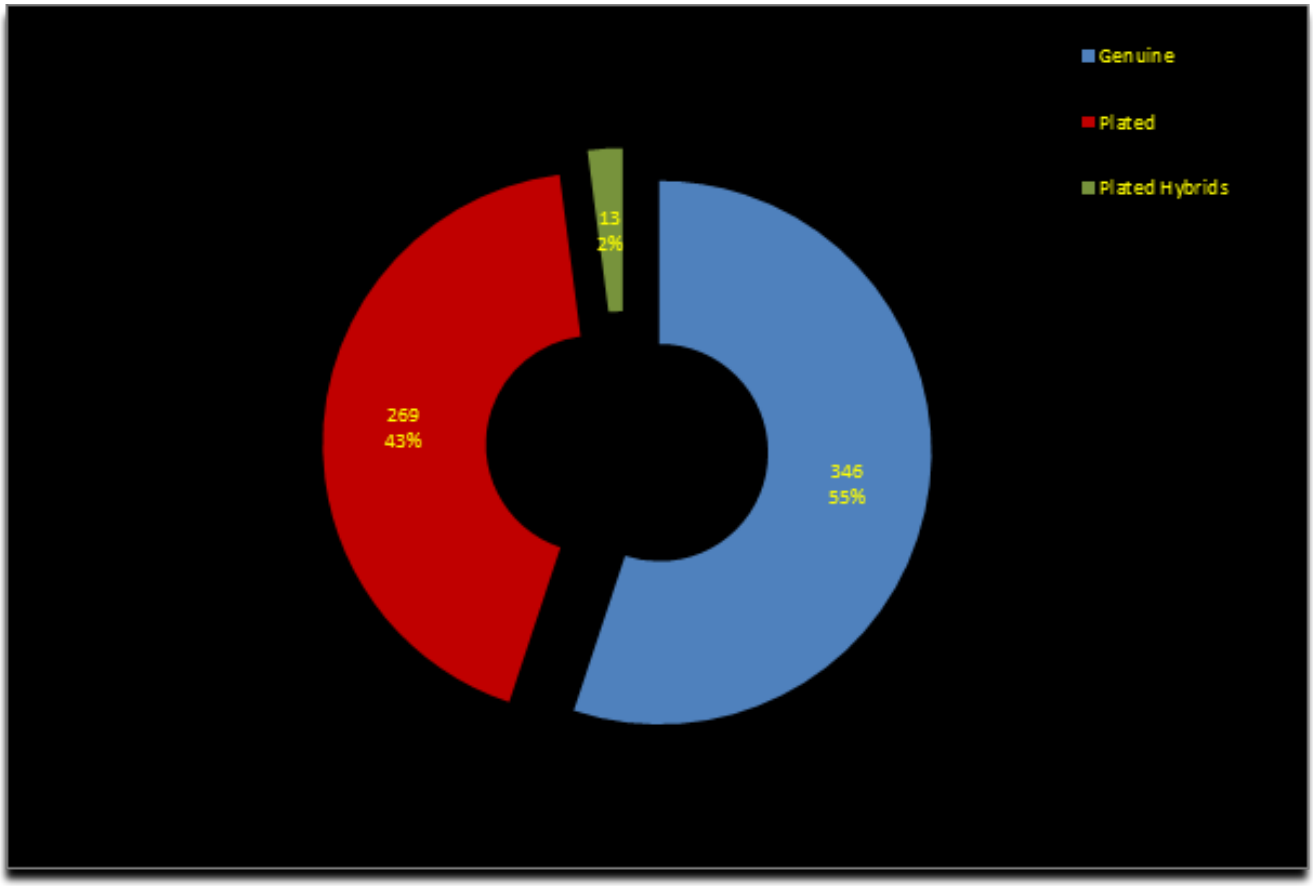


Fig. 4 – Graph of the silver coins from Apulum – number of coins and their proportion on the site;

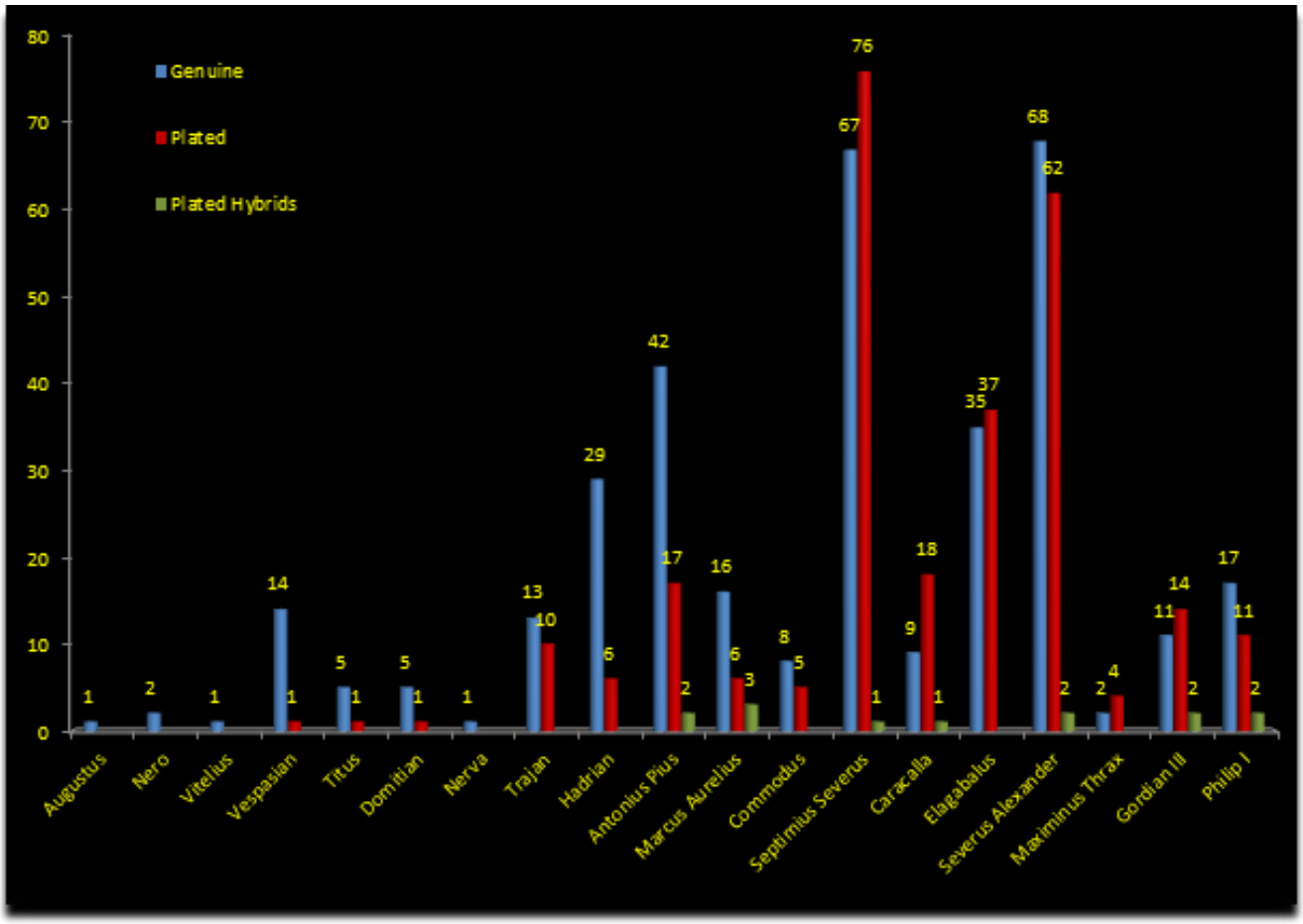


Fig. 5 – Graph of the silver coins from Apulum – number of pieces for each issuer;

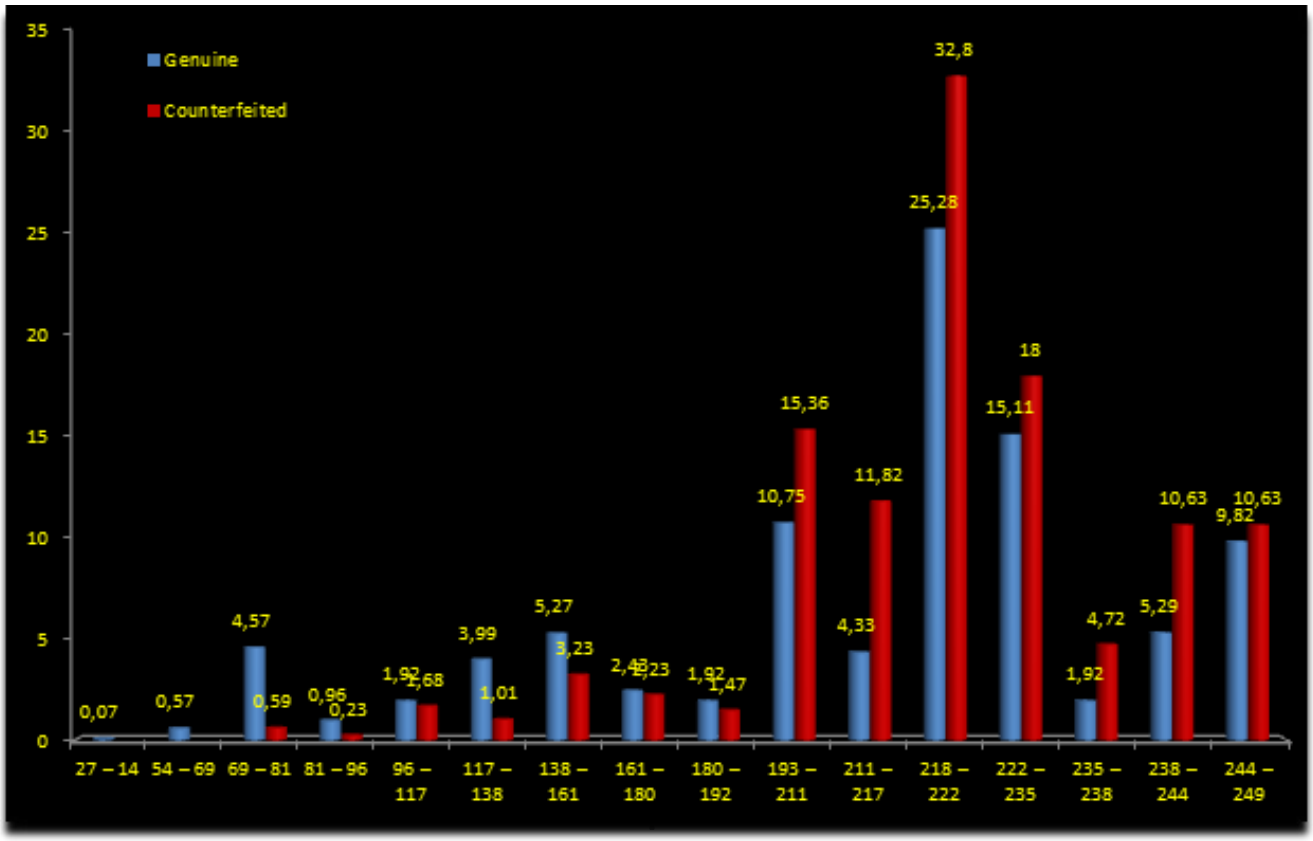


Fig. 6 – Graph of the silver coins from Apulum – monetary index;

genuine coins during the periods from Domitian (81-96) to Marcus Aurelius (161-180) and from Septimius Severus (193-211) to Severus Alexander (222-235), but for the time of emperor Caracalla (211-217) and the beginning of the Military Anarchy period, the coefficient for counterfeited coins has higher values than the one for genuine pieces.

Only for the time of Commodus (180-192) and Elagabalus (218-222) the index for genuine pieces is higher than the one for counterfeited coins.

The military garrison of **Arcobadara** (**Ilişua, Romania**) was placed in the north of Roman Dacia in order to protect the *Limes* and overview the Şomeşul Mare river and Ţibleş mountains located at the north of the site[45]. The fort was erected by *Ala I Tungrorum Frontoniana* in the 2nd century AD[46].

At Arcobadara (Fig. 10) were identified 196 genuine silver coins with a proportion of 71%, 77 plated pieces with 28%, one hybrid with 0,5% and another plated hybrid piece with 0,5%.

In (Fig. 11) it is easy to see how the genuine pieces have higher values that the counterfeit ones, only during the time of Septimius Severus (193-211) the counterfeited pieces have values as high as genuine ones.

Even so, the graph from (Fig. 12) can show a whole new situation. The monetary index for Antonine period representing genuine pieces is slightly higher than the one for counterfeited ones but starting with coins dated to Septimius Severus (193-211) the coefficient for counterfeited pieces rises in value, the new index being much higher than the coefficients for genuine pieces until the Military Anarchy period.

[45] GĂZDAC/GAIU 2011, 1.
[46] GĂZDAC/GAIU 2011, 1

Auxiliary fort of **Samum (Caşeiu, Romania)**, is situated as well on the norther border of Roman Dacia[47]. Initially the fort was builded out of wood and earth by *cohors II Britannorum* ∞ which was brought here after the participation of the unit at the Second Dacian War[48].

During the reign of Hadrian (117-138) *cohors II Britannorum* ∞ was relocated to Romiţa, in her place arriving *cohors I Britannica* ∞ *c.R. equitata*[49] building the stone phase of the fort.

The monetary situation from Samum is reduced in size because of the history of the site and the small amount of coins discovered here. After the analysis on of the available data, as we can see in (Fig. 13), there have been identified 57 genuine silver coins with a proportion of 64%, 29 plated pieces with 33% and three plated hybrids with 3%.

Most of the genuine coins from (Fig. 14) are dated for Vespasian (69-79), Trajan (98-117), Hadrian (117-138), Elagabalus (218-222) and Severus Alexander (222-235). Only during Septimius Severus (193-211) the number of counterfeited pieces dominates the number of genuine coins.

In the case of monetary coefficients (Fig. 15) it is easy to observe that at the beginning of the graph only genuine pieces are present, soon counterfeited coins are seen along with the genuine ones. For the period of 193 – 217, more exactly from Septimius Severus (193-211) to Caracalla (211-217), the monetary index for counterfeited pieces is much higher than the one for genuine pieces, followed by an intensification of the coefficient for genuine pieces under Elagabalus (218-222) and Severus Alexander (222-235). With AD 235 and the start of the Military Anarchy, the index

[47] GĂZDAC/ISAC 2007, 11.
[48] STROBEL 1984, 125.
[49] WAGNER 1938, 104-105. PETOLESCU 1997, 84-85.

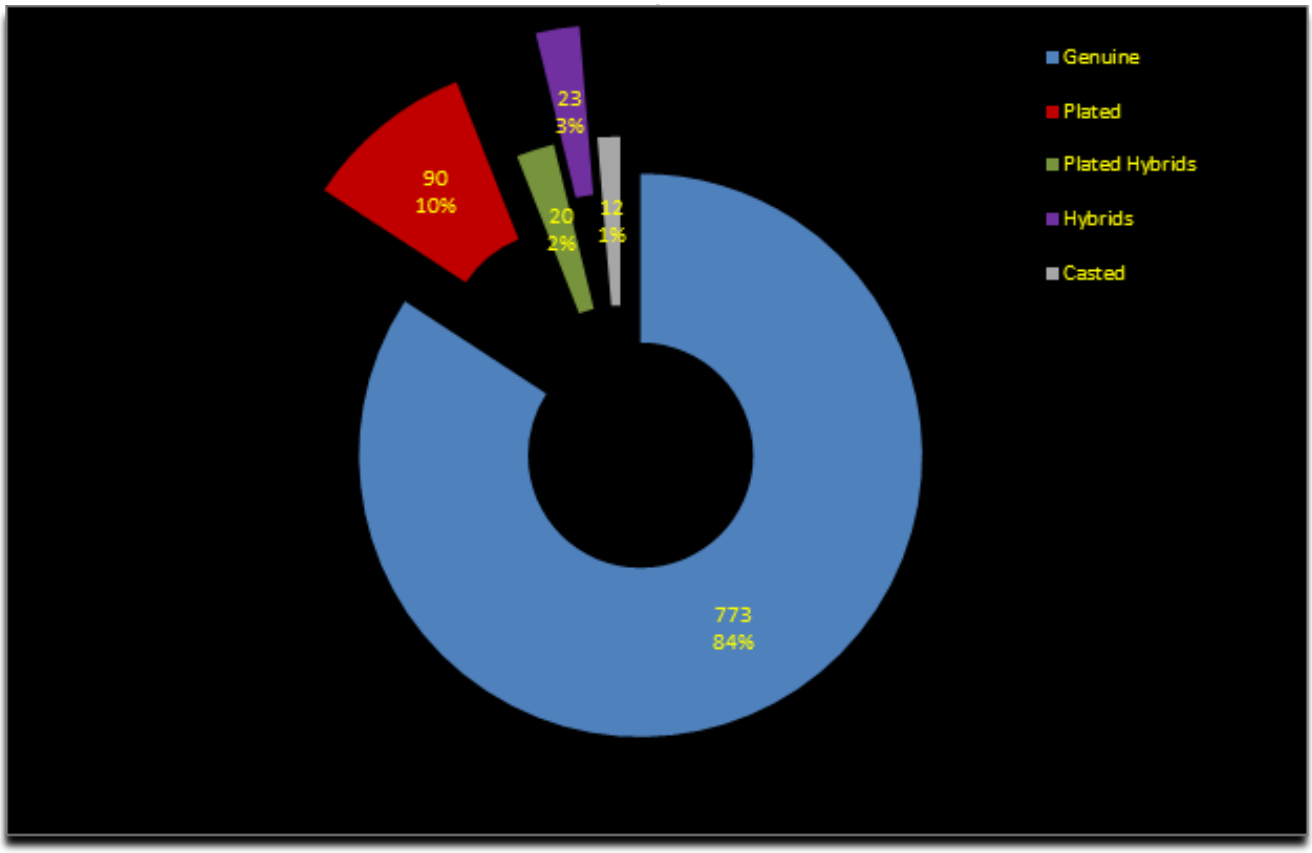


Fig. 7 – Graph of the silver coins from Potaissa – number of coins and their proportion on the site;

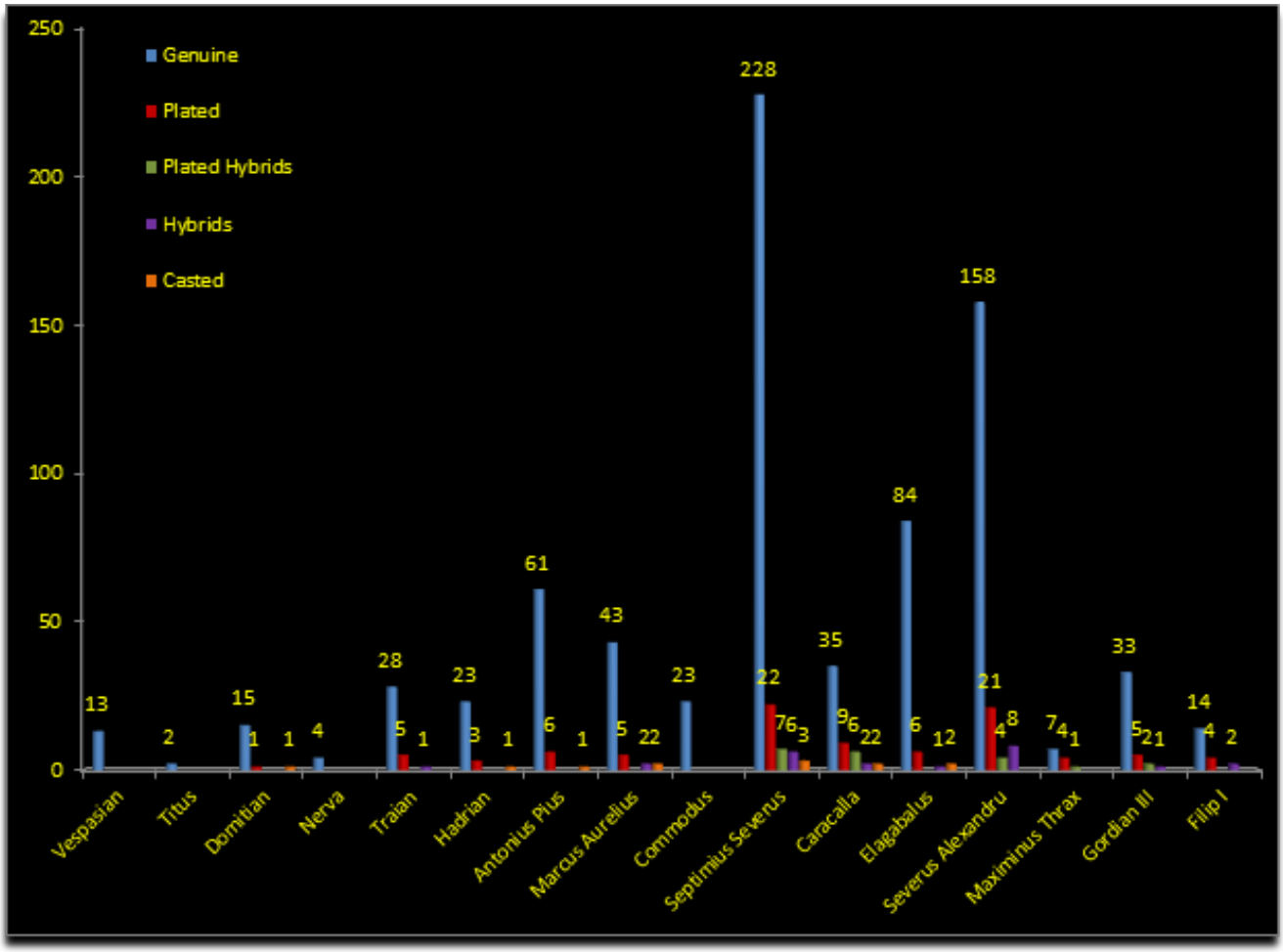


Fig. 8 – Graph of the silver coins from Potaissa – number of pieces for each issuer;

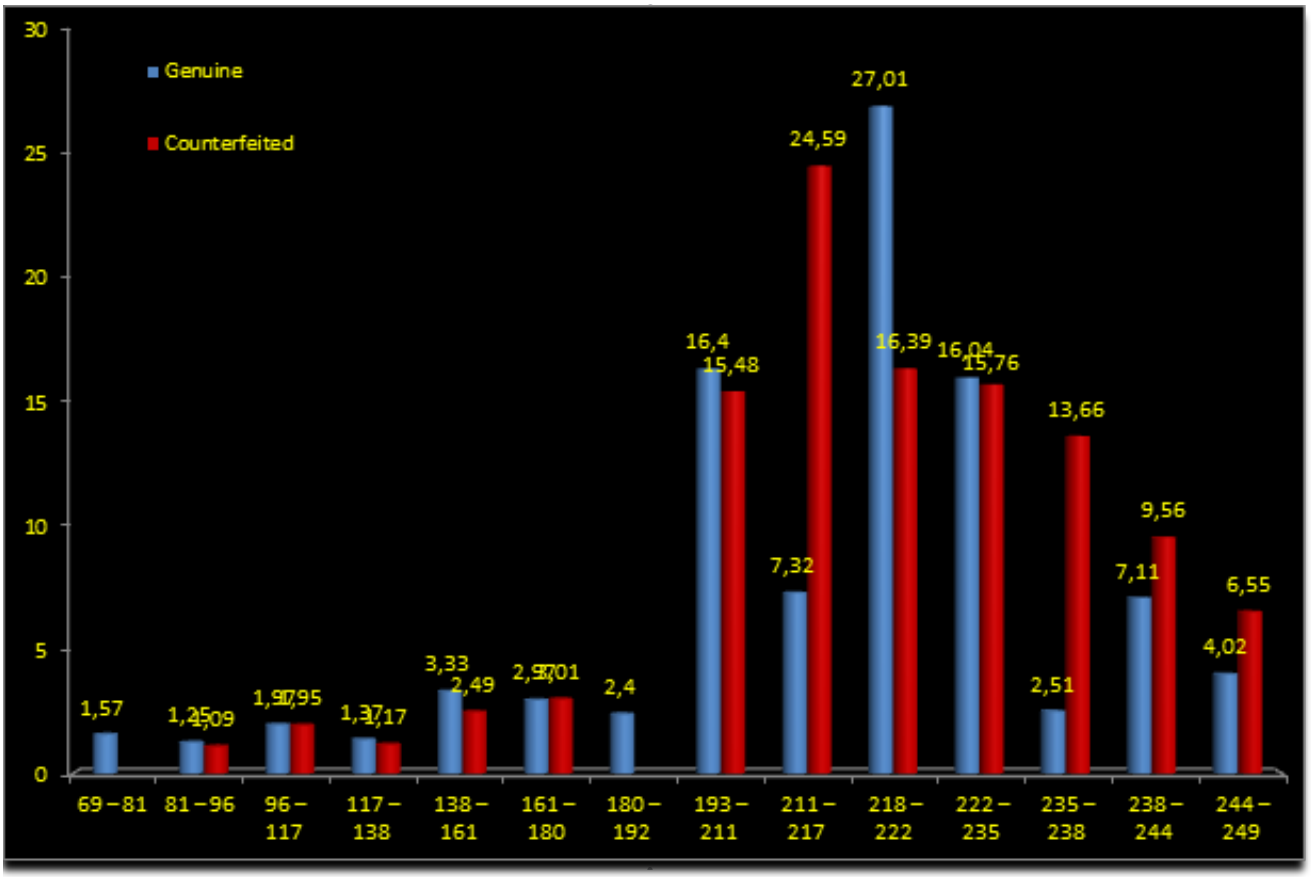


Fig. 9 – Graph of the silver coins from Potaissa – monetary index;

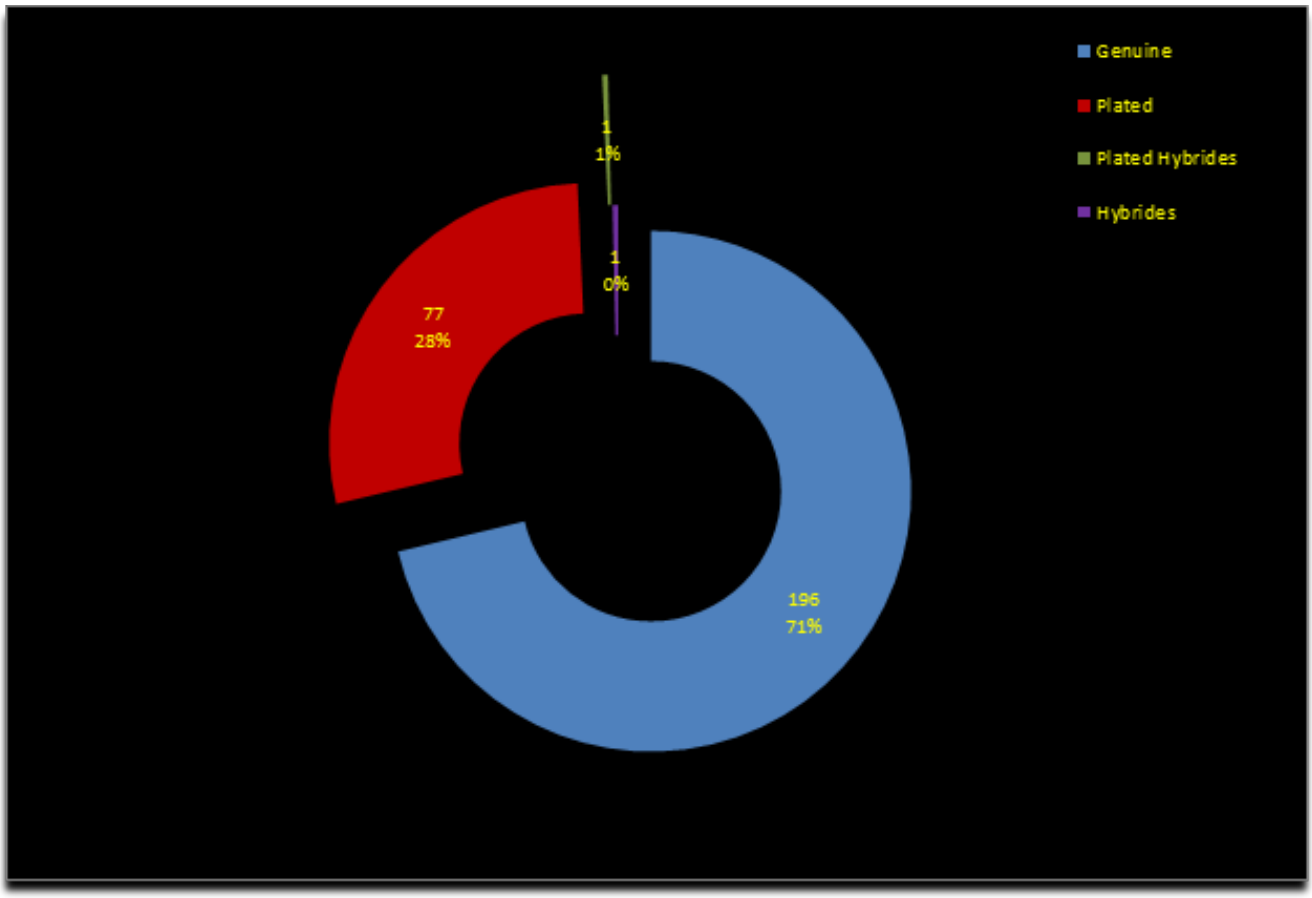


Fig. 10 – Graph of the silver coins from Arcobadara – number of coins and their proportion on the site;

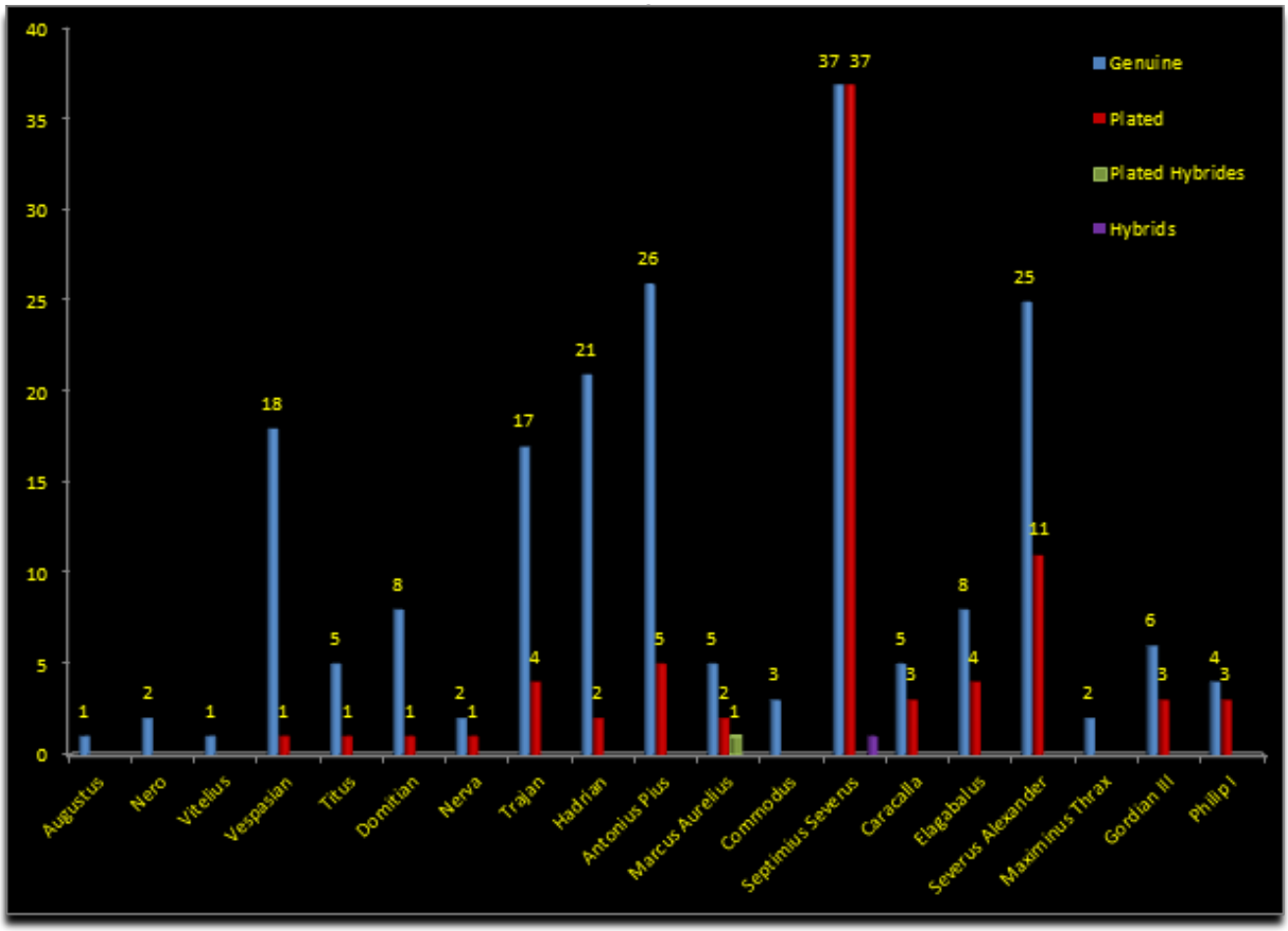


Fig. 11 – Graph of the silver coins from Arcobadara – number of pieces for each issuer;

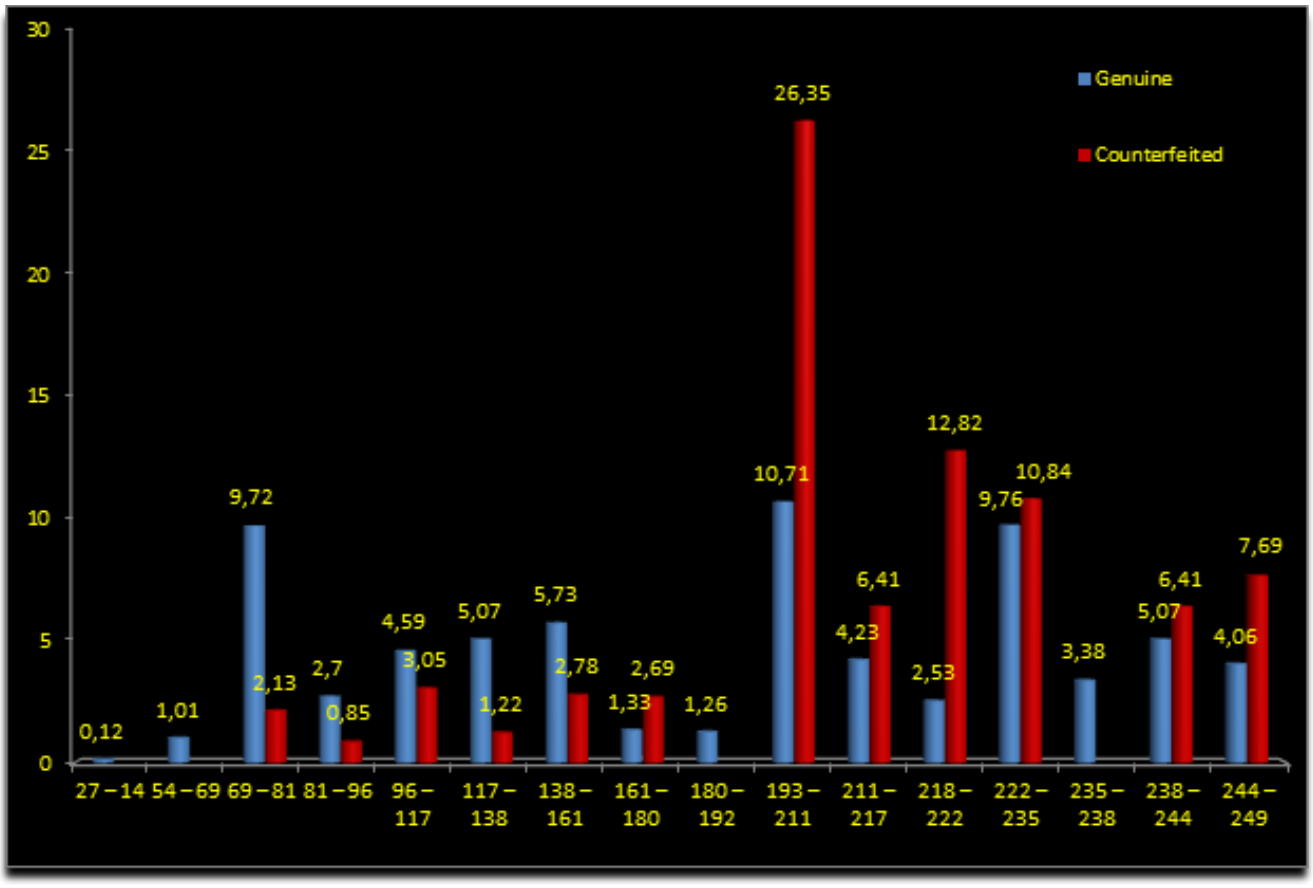


Fig. 12 – Graph of the silver coins from Arcobadara – monetary index;

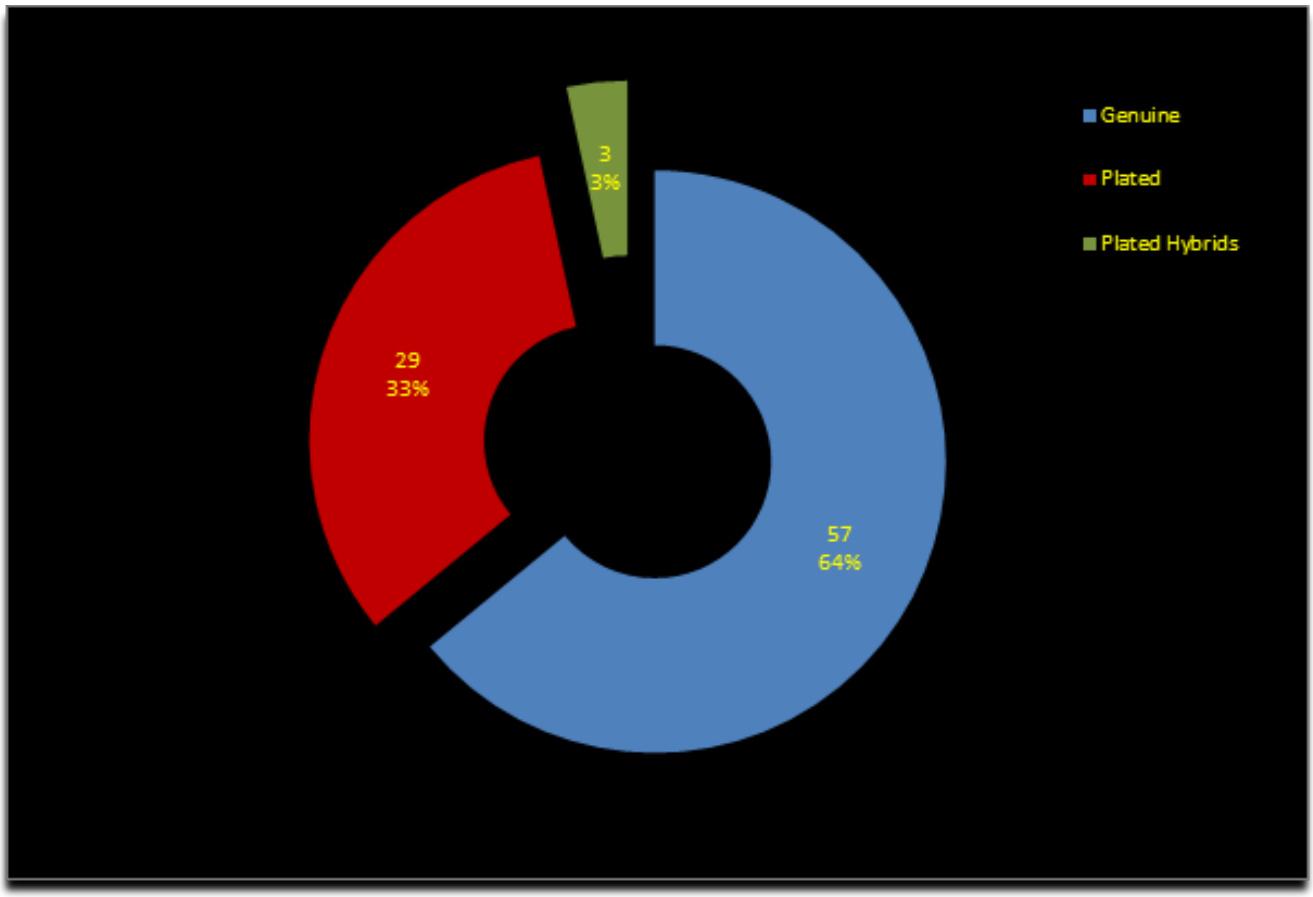


Fig. 13 – Graph of the silver coins from Samum – number of coins and their proportion on the site;

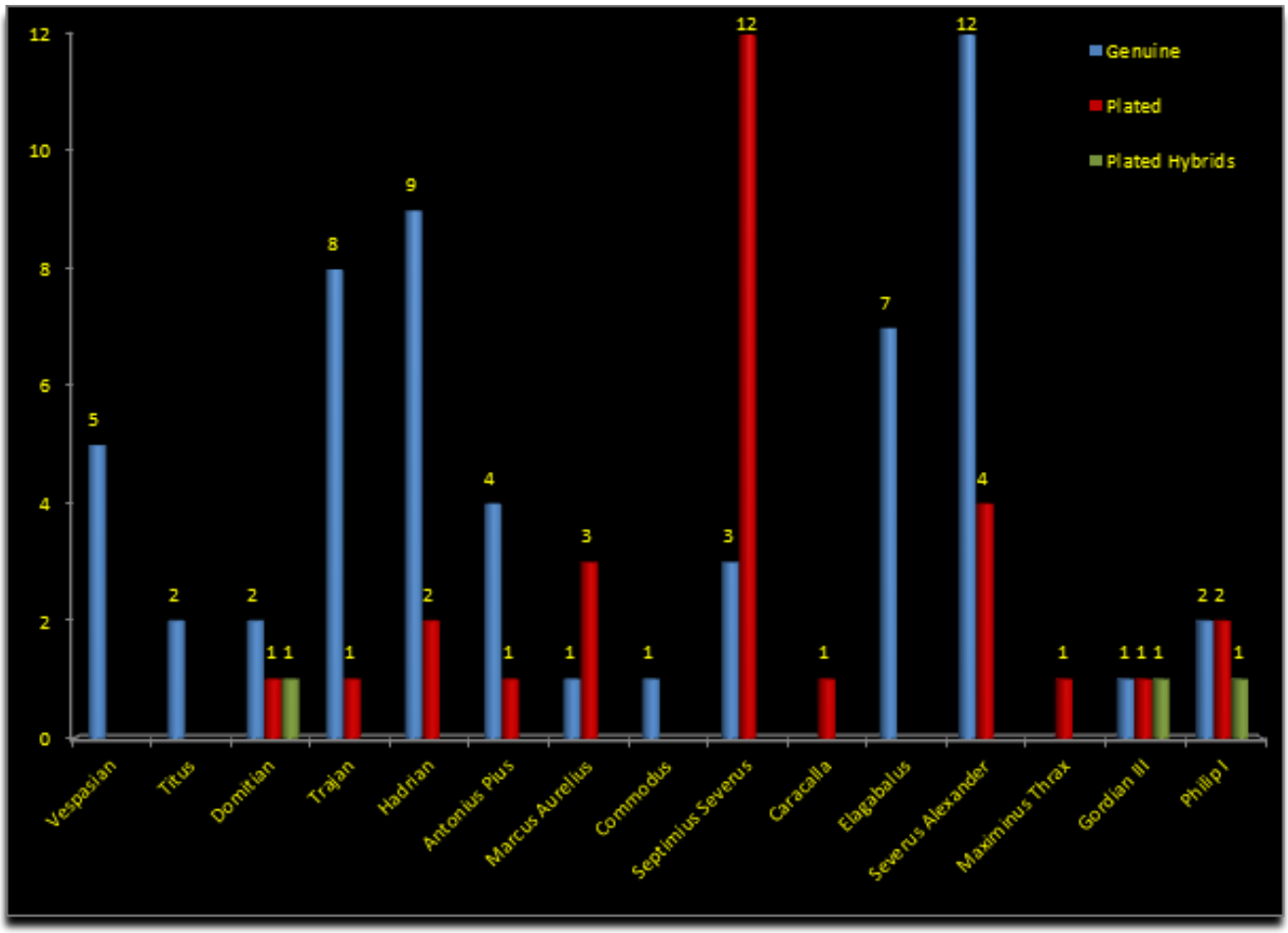


Fig. 14 – Graph of the silver coins from Samum – number of pieces for each issuer;

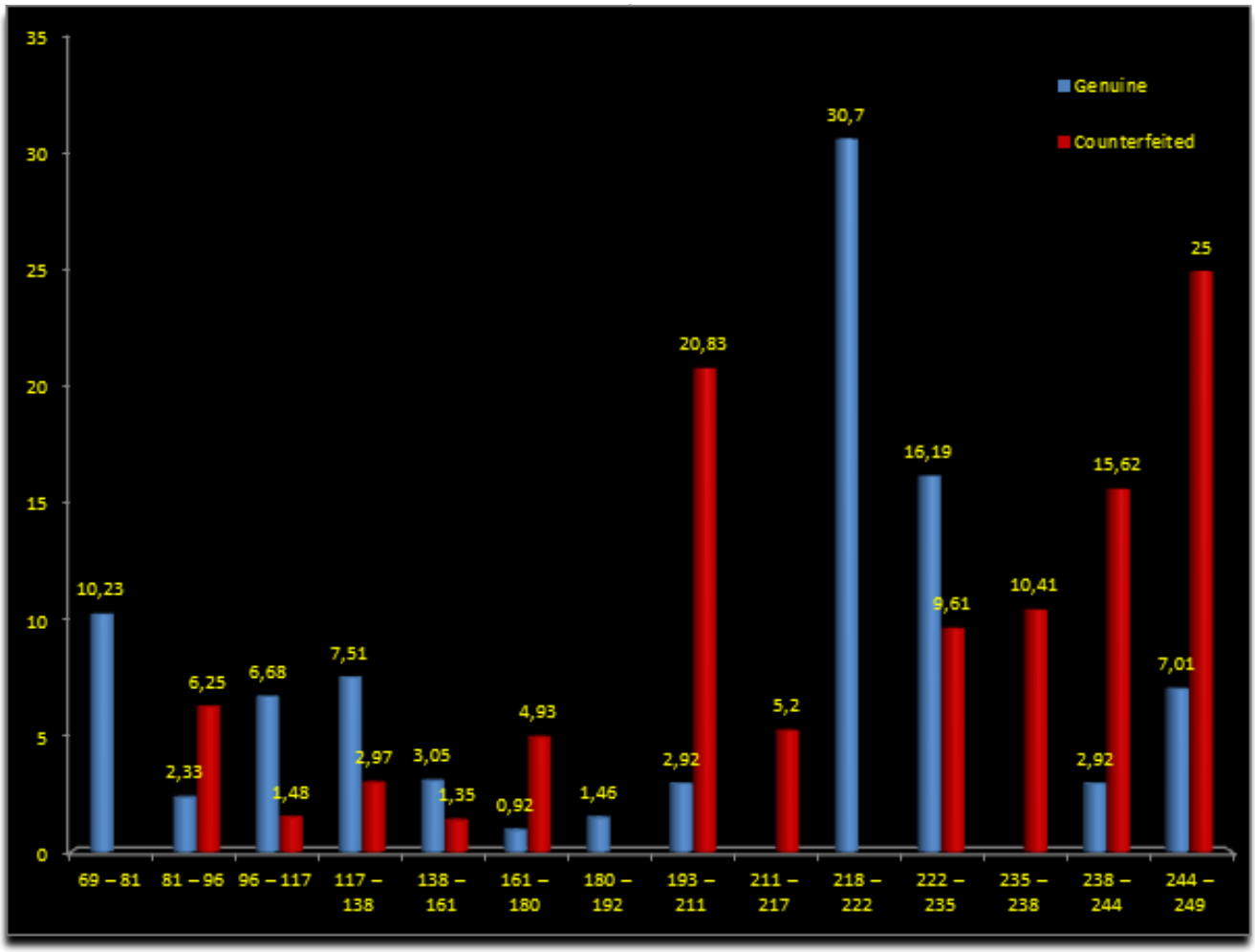


Fig. 15 – Graph of the silver coins from Samum – monetary index;

for counterfeited pieces reaches new high values which grow as intensity with time.

Buciumi (Buciumi, Romania) was a military auxiliary garrison situated on the north-west sector of Roman Dacia. Its purpose was to assist the observation towers from this part of the frontier and to assure the safe passage on the military road towards Bologa fortress by south and Porolissum with Romița fortresses to the north[50]. Initially the *castrum* was erected from wood and earth, later by stone[51].

The military encampment served as garrison for *Cohors I Augusta Iturneorum sagittariorum* and later on for *Cohors II Nervia milliaria Pacensis* during the 2nd and 3rd centuries AD.

At Buciumi (Fig. 16) there have been discovered 93 genuine silver coins with a proportion of 56% and 74 counterfeited pieces with 44%. Even on a small site like this we can observe a similar pattern for coin distribution.

Counterfeited pieces (Fig. 17) have the largest values during Septimius Severus (193-211) and equal in quantity with the genuine coins for the periods of Vespasian (69-79), Trajan (98-117), Antonius Pius (138-161), Elagabalus (218-222) and Severus Alexander (222-235).

It is possible to see (Fig. 18) how counterfeited coins are present for all the periods, the highest point for them remaining under Septimius Severus (193-211). The coefficient for genuine pieces during the reign of Elagabalus (218-222) is very interesting as being unusually high compared with other periods from the site.

With the help of some natural and geographical elements, slightly bend plateau and descending terraces, a rich area in timber, springs, stone, clay and salt, made **Porolissum (Moigrad, Romania)** an ideal location for living and resource exploitation[52].

It is possible to date the arrival of Roman troops here at AD 106 based on two military diplomas[53]. Porolissum was a key point in the *limes* from north Dacia, serving as a gateway between Dacia and *barbaricum*, integrated with other forts and watchtowers to form a protective barrier.

Initial, detachments of Legion IIII Flavia Felix and XIII Gemini alongside cohorts I *Ulpia Brittonum*, V *Lingonum*and I *Augusta Ituraeroum*, all of them being identified by stamp bricks and tiles[54], arrived here to secure the protection of the area. With the first half of the 3rd century, the stone phase of the *castrum* was erected, it had new stone made towers, gates, firing platforms, the new troops that will replace the old garrison were cohorts I *Ulpia Brittonum*, I *Ituraeorum Sagittariorum* and V *Lingonum*[55].

In the case of Porolissum represented in (Fig. 19), 690 genuine coins have been discovered with a proportion of

[50] GĂZDAC/PRIPON 2012, 11.
[51] RUSSU 1959, 305-317.
[52] GĂZDAC/GUDEA 2006, 11.
[53] GĂZDAC/GUDEA 2006, 14.
[54] GĂZDAC/GUDEA 2006, 15.
[55] GUDEA 1989, 57-83. GUDEA 1997.

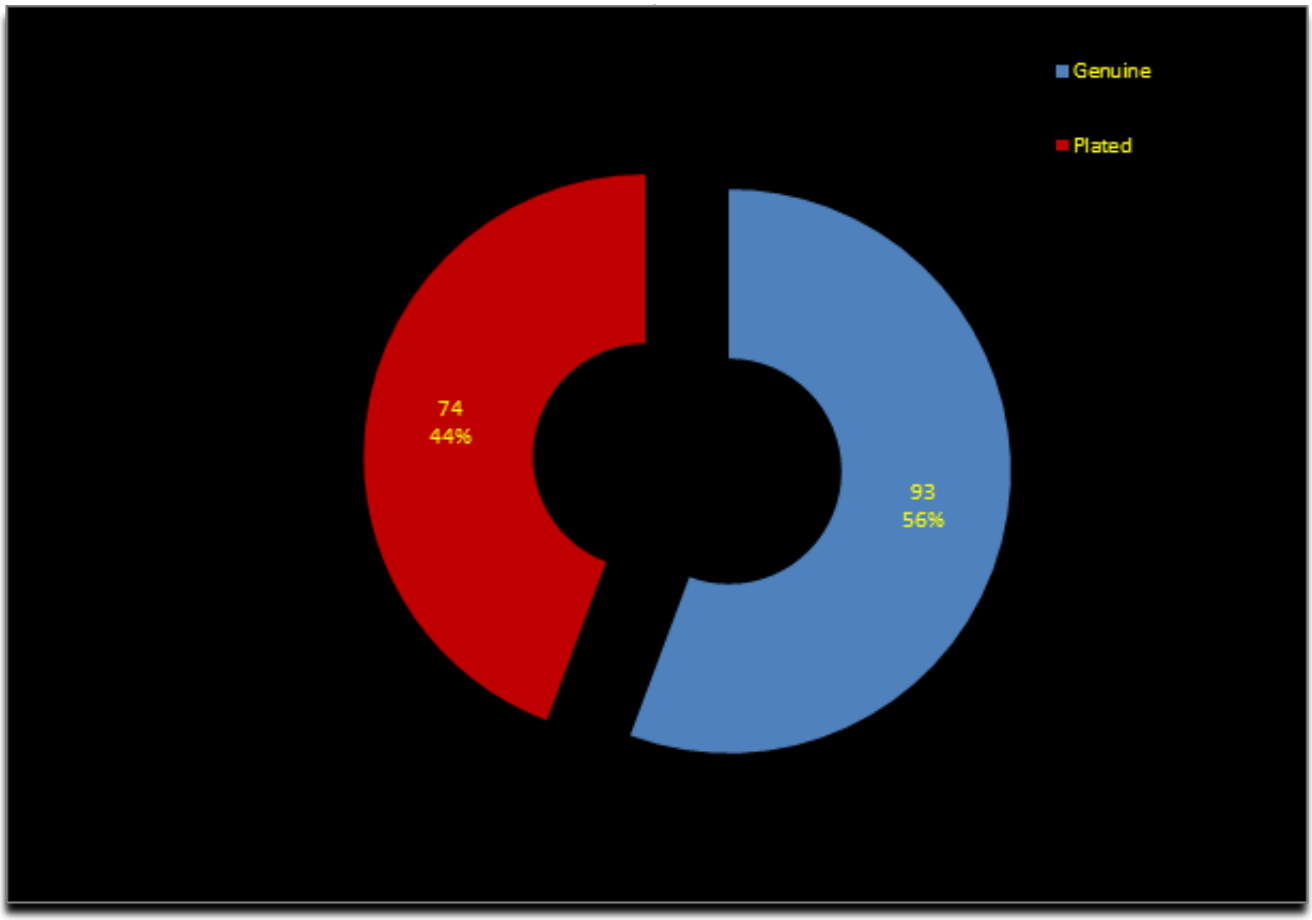


Fig. 16 – Graph of the silver coins from Buciumi – number of coins and their proportion on the site;

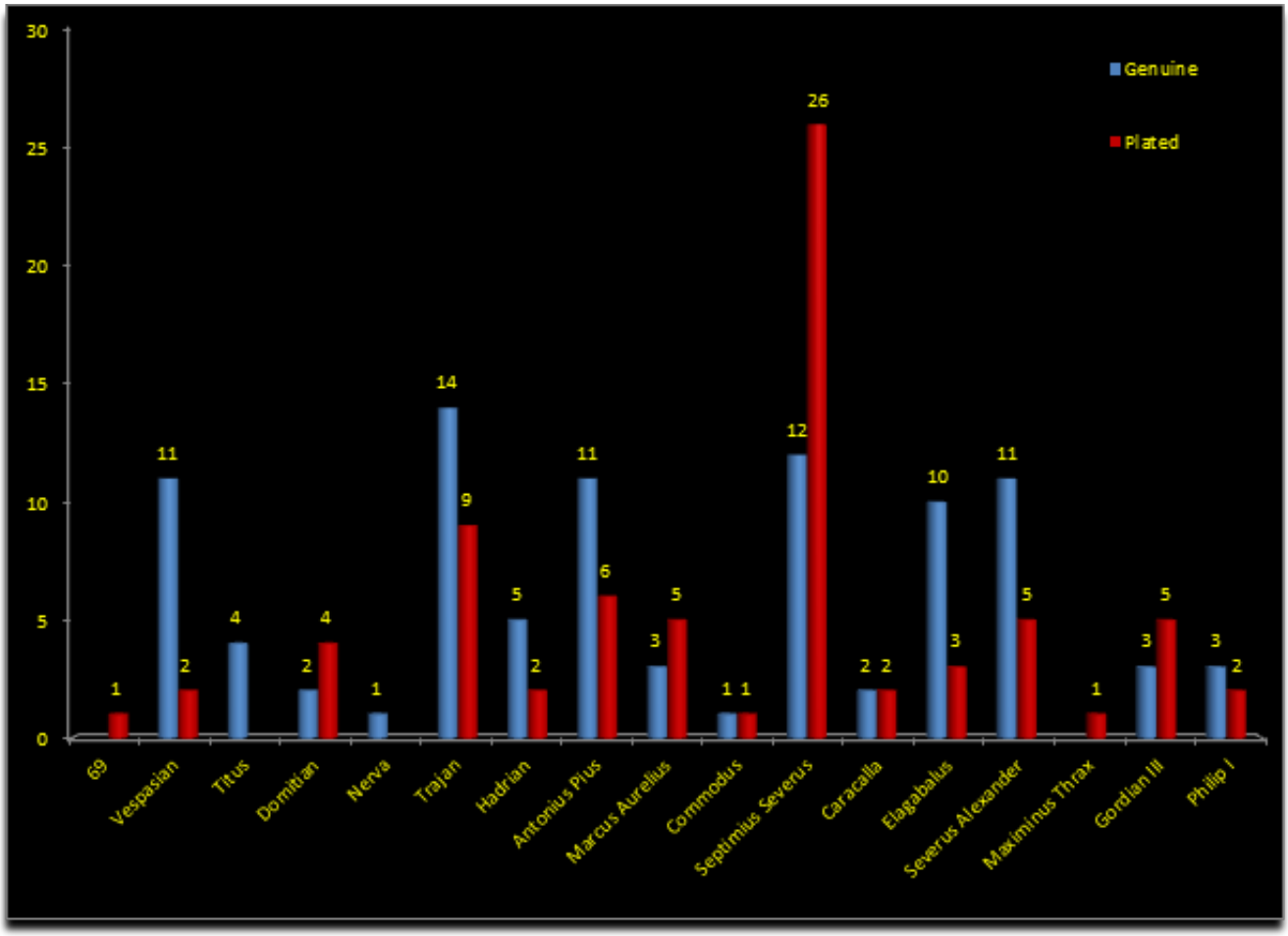


Fig. 17 – Graph of the silver coins from Buciumi – number of pieces for each issuer;

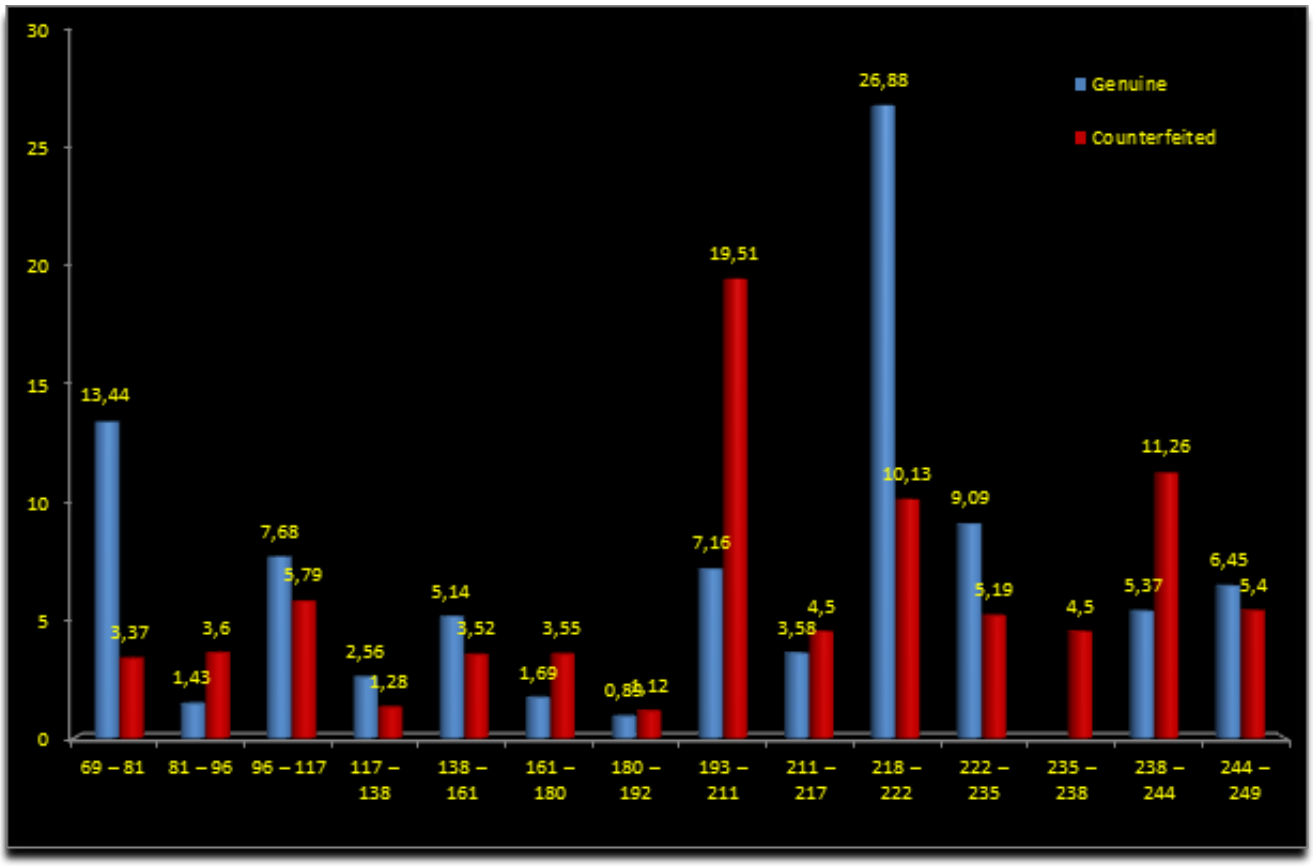


Fig. 18 – Graph of the silver coins from Buciumi – monetary index;

59% from the total amount of silver pieces, 476 plated with 40%, six hybrids representing 1% and five plated hybrids with 1% as well.

As we can see in (Fig. 20) one third of coins dated at the Antonine period and at the second part of the Severan period are counterfeited, while for Commodus (180-192) and Caracalla (211-217) half of the total amount of pieces are plated. Only in the case of Septimius Severus (193-211) the counterfeited coins overpass in numbers the genuine ones with almost 1/3.

The monetary index from (Fig. 21) shows how the coefficient for counterfeited pieces is almost equal in value with that for genuine coins during the Antonine period, it rises above the genuine coin index at the beginning of the Severan period and goes down in value during the second part of the same period. With the start of the Military Anarchy the index for counterfeited pieces goes up in value again. The largest value reached by this coefficient is during Septimius Severus (193-211) when it is twice and a half higher than the index for genuine pieces.

The first military encampment from **Intercisa** (**Dunaújváros, Hungary**) was constructed out of wood and earth during the reign of Trajan (98-117)[56] being remade using stone walls later on in the Severan period[57]. The fortress suffers damage in more than one situation, during the wars against the Iazyges (117-118), the Marcomannic in AD 178[58] and later on from the Roxolani in AD 260[59]. Repaired during the beginning of Tetrarchy it will hold on until the abandonment of the province.

Garrison during the time of Vespasian (69-79) consisted of *ala II Asturum* which was later replaced by *ala I Augusta Iuteraeorum sagittariorum* between the years AD 92 – 105[60], succeeded by *ala I Britannica, ala I Tungrorum Frontoniana, ala I Thracum veterana, ala I civium Romanorum* until the year of AD 176[61] when the last one is replaced with *cohors I Hemesenorum* made out of archers from Syrian Emesa[62]. The town enters a period of economic and cultural rebirth with the arrival of new Syrian inhabitants that followed the cohort here[63].

Situated in the south of the fortress a *vicus* was created, roughly in the same time with the earth phase of the fortress. The *vicus* enters a period of prosperity and extends in dimensions during the end of the 2nd century. After the death of Severus Alexander (222-235), Intercisa enters its downfall[64], because of the geographical location right in the path of barbarian invasions.

Following the research made at Intercisa (Fig. 22), 381 genuine silver coins have been identified, with a proportion of 87% and 56 plated with 13%.

Also, in (Fig. 23) it is easy to observe the distribution of this coins depending on the issuer. Counterfeited coins are present in the Antonine and Severan period but are only a small fraction of the total number of coins.

The monetary coefficient from (Fig. 24) shows a different situation, the index for genuine pieces is rising at a steady rhythm over the periods while the one for

[56] FODOREAN 2014, 63.
[57] VISY 2003, 188.
[58] VISY 2011, 53.
[59] VISY 2011, 54.
[60] VISY 2003, 117-118.
[61] VISY 2003, 117-118.
[62] VISY 2011, 53.
[63] VISY 2011, 54.
[64] TPECS 1999, Intercisa.

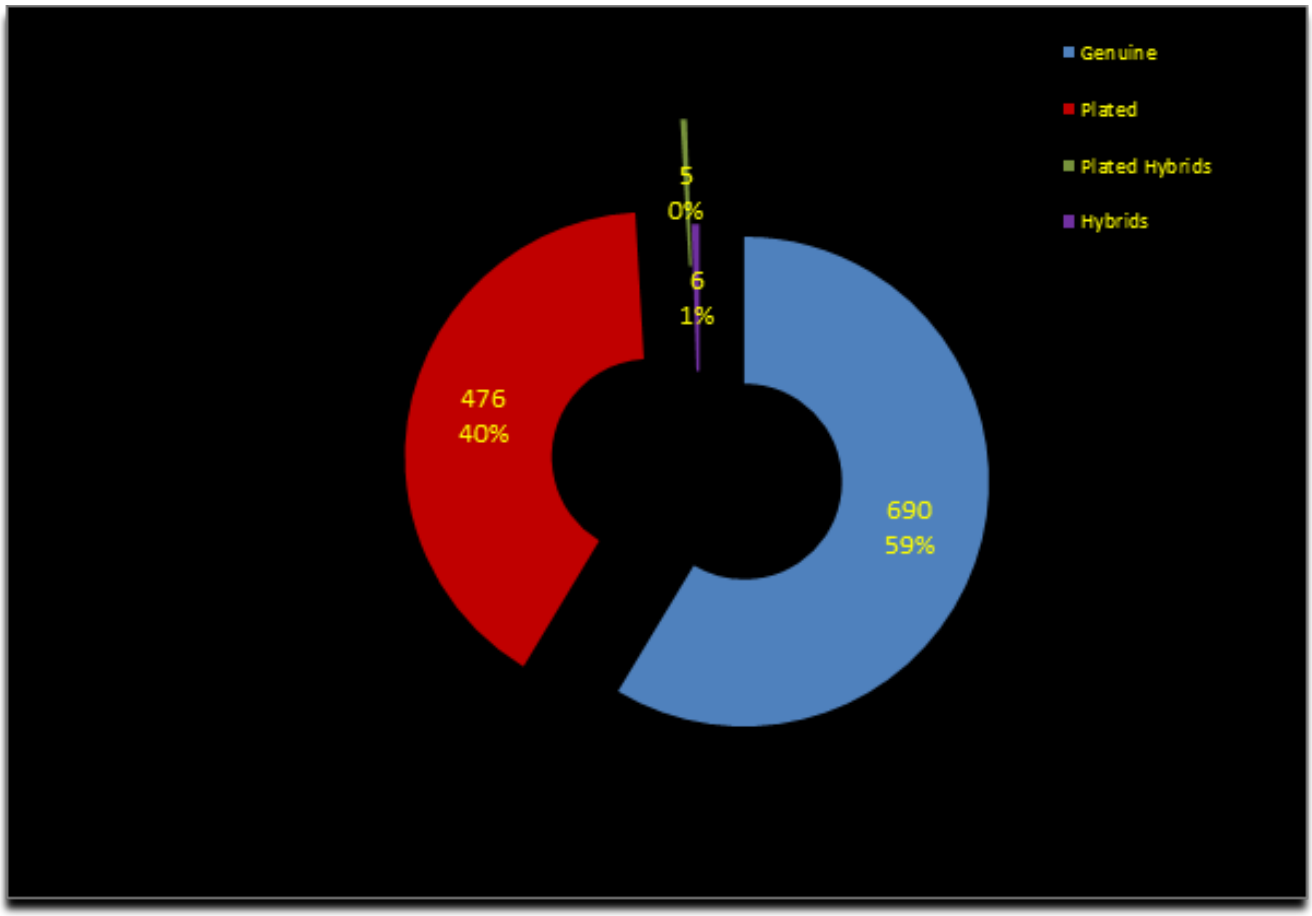


Fig. 19 – Graph of the silver coins from Porolissum – number of coins and their proportion on the site;

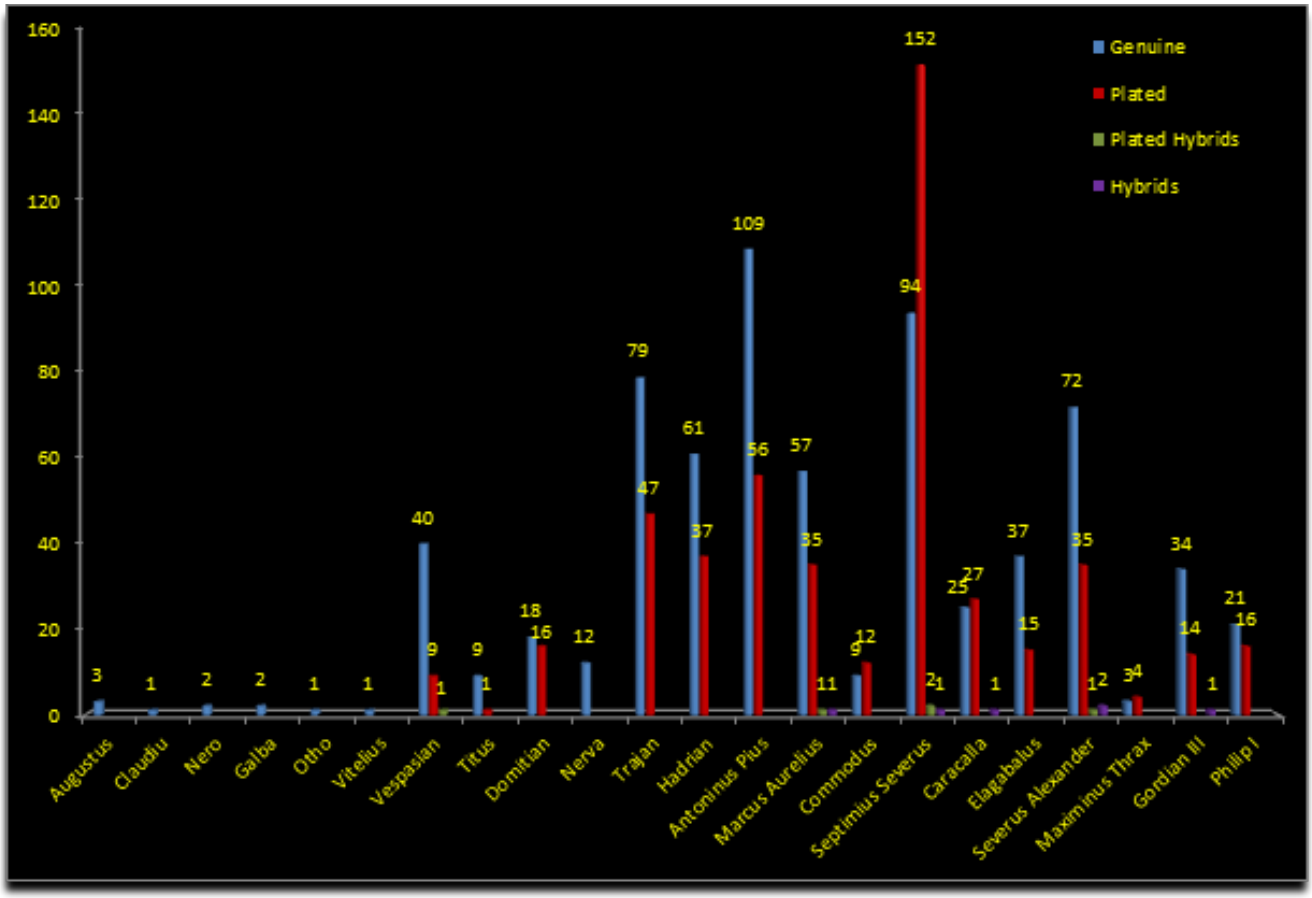


Fig. 20 – Graph of the silver coins from Porolissum – number of pieces for each issuer;

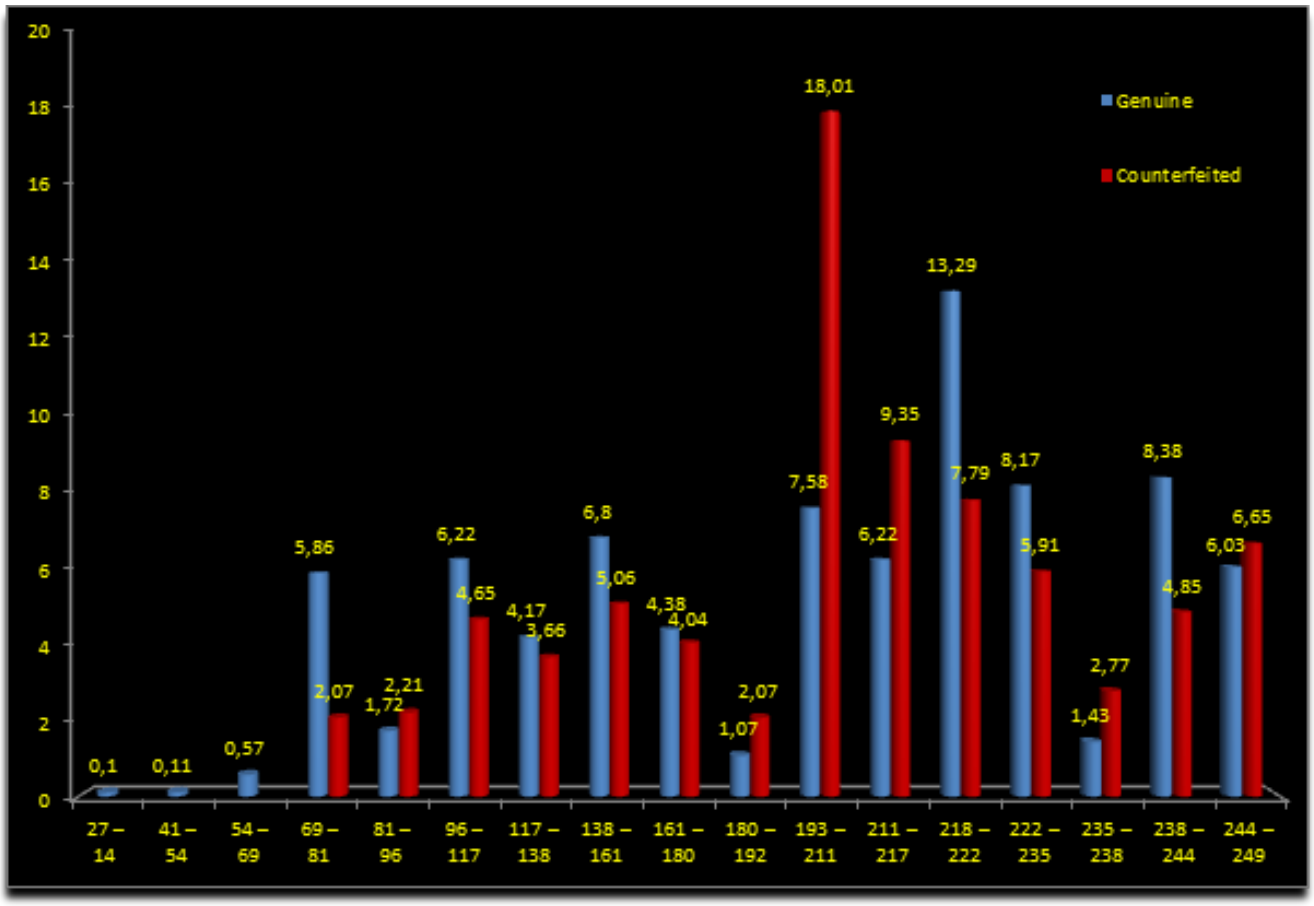


Fig. 21 – Graph of the silver coins from Porolissum – monetary index;

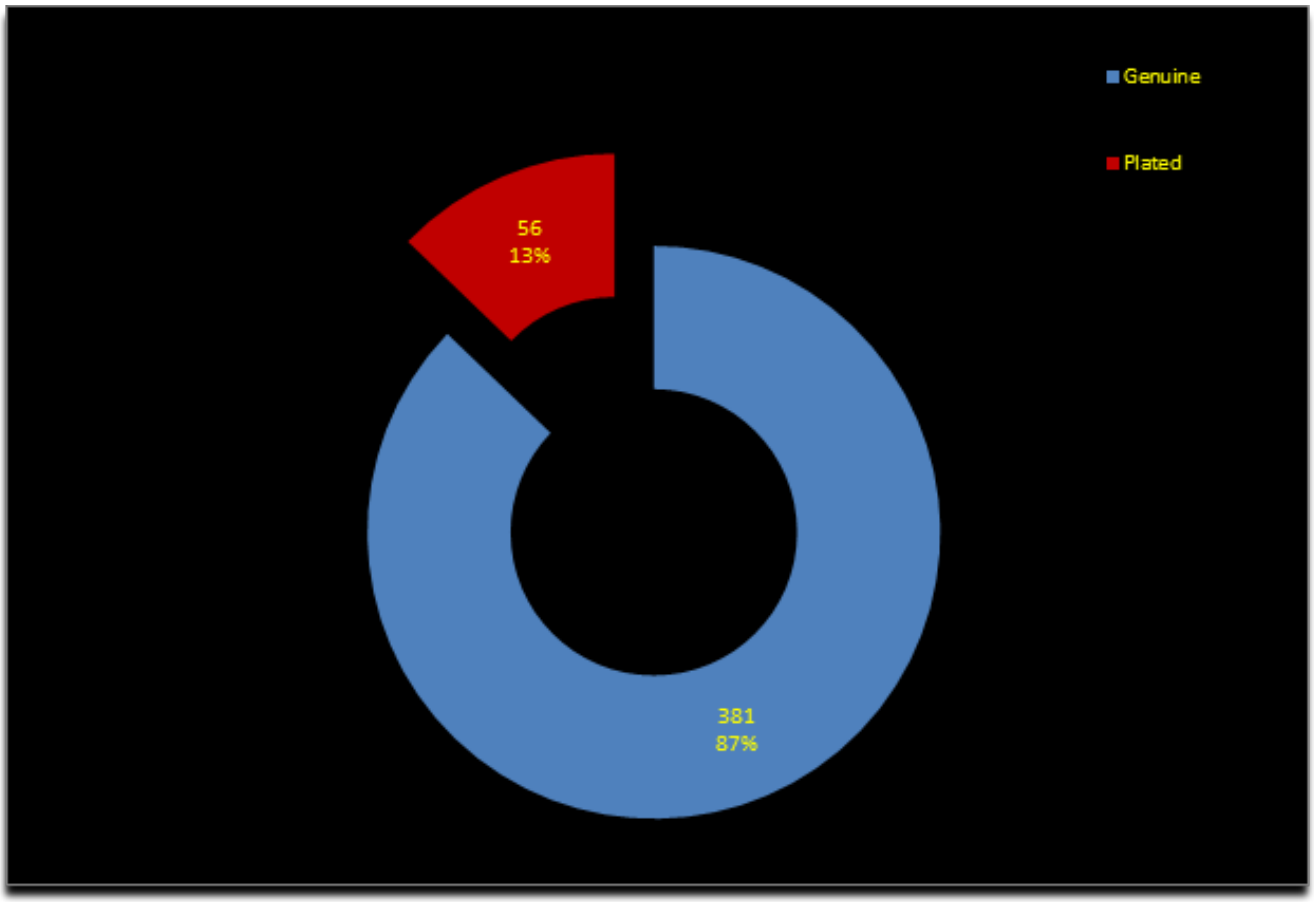


Fig. 22 – Graph of the silver coins from Intercisa – number of coins and their proportion on the site;

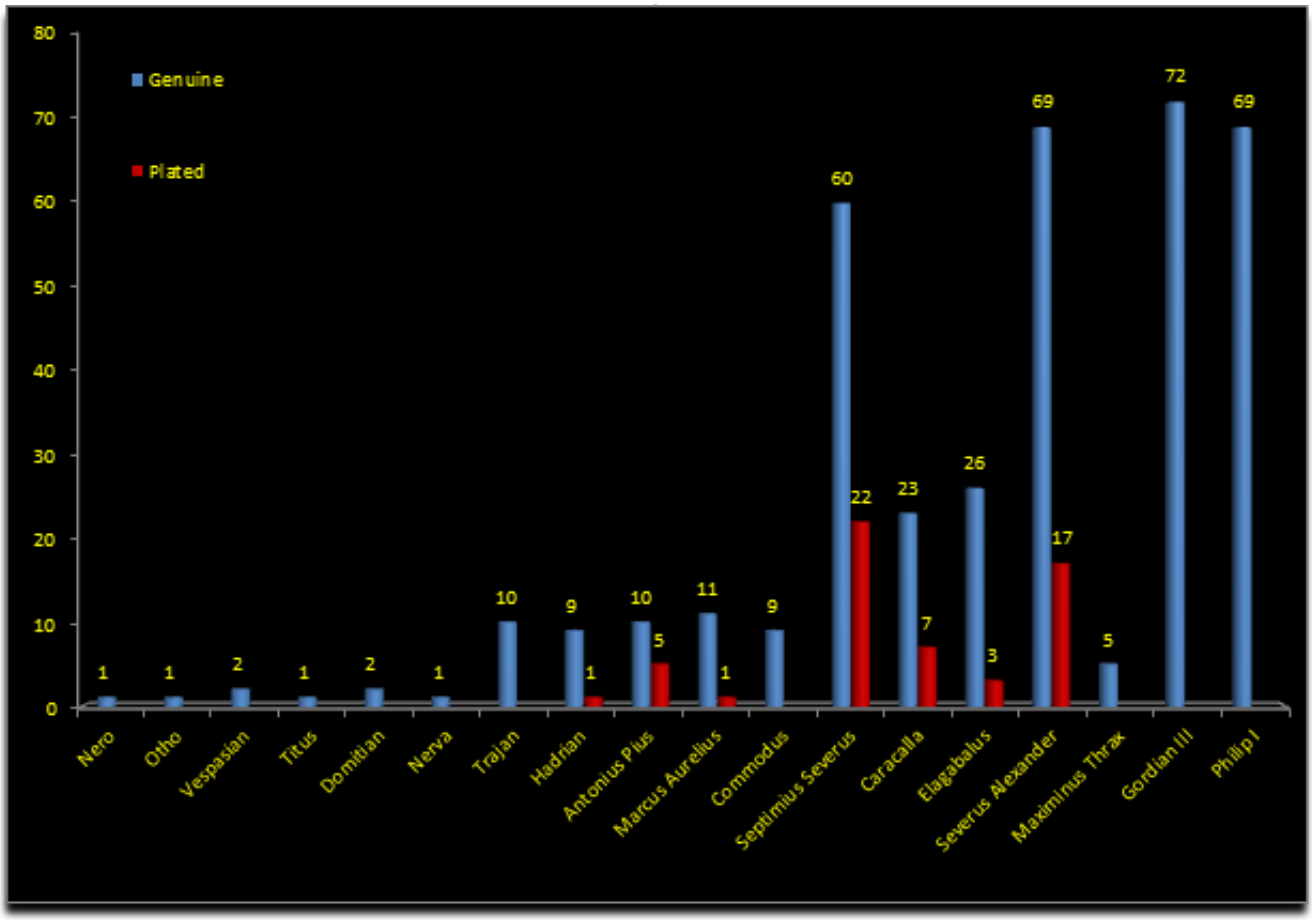


Fig. 23 – Graph of the silver coins from Intercisa – number of pieces for each issuer;

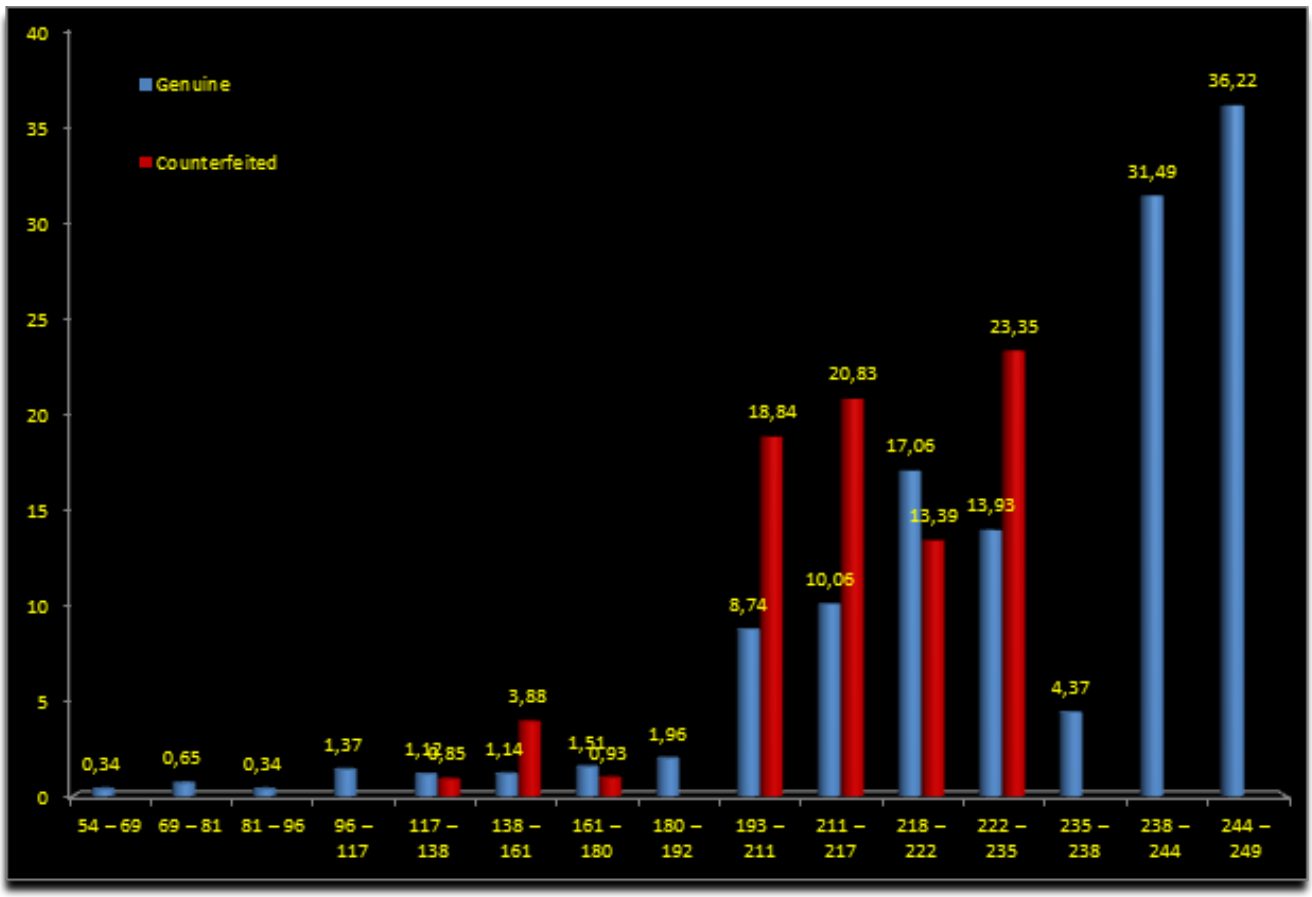


Fig. 24 – Graph of the silver coins from Intercisa – monetary index;

counterfeited coins has high values during the Severan period.

At about AD 50, a military encampment was erected at an intersection of some roads in Pannonia, the site later become **Gorsium**[65] **(Tác, Hungary)**. Here was first placed *ala I Scubulorum* for a few years, after the displacement Roman troops a new civilian settlement flourished in the former location of the *castrum*, later raised at the rang of *municipia* by emperor Hadrian (117-138)[66].

Towards the end of the 1st century AD a new auxiliary fort was constructed south of the civil area and placed under the protection of cohort *Alpinorum equitata*[67]. After the partition of Pannonia in AD 106 by emperor Trajan (98-117), Gorsium will became the religious centre of Pannonia Inferior.

In AD 178 the civil settlement was partially destroyed by the Sarmatians, reconstructed under Septimius Severus (193-211) only to be completely destroyed by Roxolans in 260[68]. The town was only inhabited again during the reign of Diocletian (285-305) but the name changed to **Herculia**[69].

Monetary discoveries from Gorsium-Herculia (Fig. 25), present 330 genuine pieces with a proportion of 96%, four plated coins representing 1% and 10 hybrids with 3%.

In (Fig. 26) we may see how the amount of genuine coins grows in time, the highest values starting to appear during the Severan period and the beginning of the Military Anarchy. The few counterfeited or hybrid coins have been dated to the same periods.

Because of the very few counterfeited examples, the Ravetz[70] formula which was used to create the graph referring to monetary index (Fig. 27) does not offer correct results when it comes to counterfeited pieces. Still in the case of the genuine coins, the coefficients are reliable and show how the monetary distribution grows in time, with a constant rhythm that starts during the Severan Dynasty.

Located on the Danube, **Solva (Hungary)** was constructed in the 1st century AD in order to become an important point on the Danubian frontier, later raised to the rang of *municipia* by emperor Hadrian (117-138) in 121[71].

Here was stationed *cohors I Ulpia Pannoniorum,* that constructed the stone phase fortress from the begging of the 2nd century[72].

In fig. 28 we see the numismatic discoveries of 106 genuine coins with a proportion of 90% plus 12 plated pieces with 10%.

Distributing the coins for each issuer (Fig. 29), shows a constant rhythm for genuine pieces with high values for the periods of Antonius Pius (138-161), Septimius Severus (193-211) and Severus Alexander (222-235). Counterfeited coins are present but in small numbers.

When trying to establish the monetary index of the site (Fig. 30), the coefficient for counterfeit pieces has very high values, equal in size with the genuine one or even higher. This is responsible because of the small amount of counterfeit pieces which influence the correctness of the coefficient for them. On the other hand, the index for genuine coins shows a normal growth in time, Roman presence amplifies from the 2nd century as it does on many sites from Pannonia.

Military encampment, *cannabae* and *municipia,* **Brigetio (Szőny, Hungary)** was a Roman settlement located in Pannonia on the shore of the Danube that incorporated all of them[73].

The military fortress was erected most probably at the same time with the one from Carnuntum[74], finished by Legion XI Claudia that garrison the *castrum* until AD 105 when replaced with Legion XXX Ulpia Victrix from Germany[75]. Because of its bad location, the camp was at the mercy of the Danube, most probably being flooded, so the initial location was abandoned, the fortress moved to a higher ground towards east where it was constructed from stone by Legion I Adiutrix in the year AD 119[76] and garrisoned until late Antiquity.

The fort was subject to destruction in more than one occasion, first partially destructed during the Marcomannic Wars under Marcus Aurelius (161-180)[77] later a complete destruction followed that was dated during the Tetrarchy[78], even so the fort was reconstructed and abandoned only in late antiquity.

Many Roman military troops have been garrisoned here, identified with the help of epigraphical sources, this way we know of *Cohors I Britannica milliaria C.R.* at about AD 80[79], *ala I Pannoniorum Tampiana* and *Cohors I Alpinorum Equitata* close to AD 90[80]. At the beginning of the 2nd century AD, *Cohors I Iturerorum sagittariorum* and *ala I Hispanorum Arvacorum* arrived here while at the end of the century, vexillatio from Legion XIIII Gemini and IV Flavia[81] were send here.

Alongside those land forces, epigraphical sources identify naval units belonging to *Classis Flavia Histrica* and *Classis Flavia Pannoniae*[82].

Close by, at 4 Km west from the military fortress, a Roman town is present which will receive the title of *municipium* from emperor Caracalla (211-217)[83] and later became *coloniae,* Brigetio turns into the economic and cultural centre of this part of the limes, soon after it was annexed by Pannonia Inferior[84].

In the case of Brigetio represented in (Fig. 31), there have been identified 1.015 genuine coins with a proportion of 78%, 289 plated pieces with 22% and one hybrid with 0,01%.

The coin distribution (Fig. 32), shows how genuine pieces are present in high numbers for all periods, especially for emperors like Trajan (98-117), Antonius Pius (138-161),

65 TPECS 1999, Gorsium.
66 TPECS 1999, Gorsium.
67 TPECS 1999, Gorsium.
68 TPECS 1999, Gorsium.
69 TPECS 1999, Gorsium.
70 CASEY 1974, 41.
71 KELEMEN 1995, 1.
72 KELEMEN 1995, 1.
73 VISY 2011, 43.
74 VISY/NAGY 2003, 209.
75 VISY 2011, 46.
76 VISY 2011, 46.
77 TPECS 1999, Brigetio.
78 TPECS 1999, Brigetio.
79 TPECS 1999, Brigetio.
80 TPECS 1999, Brigetio.
81 TPECS 1999, Brigetio.
82 TPECS 1999, Brigetio.
83 FODOREAN 2014, 80.
84 VISY/NAGY 2003, 229.

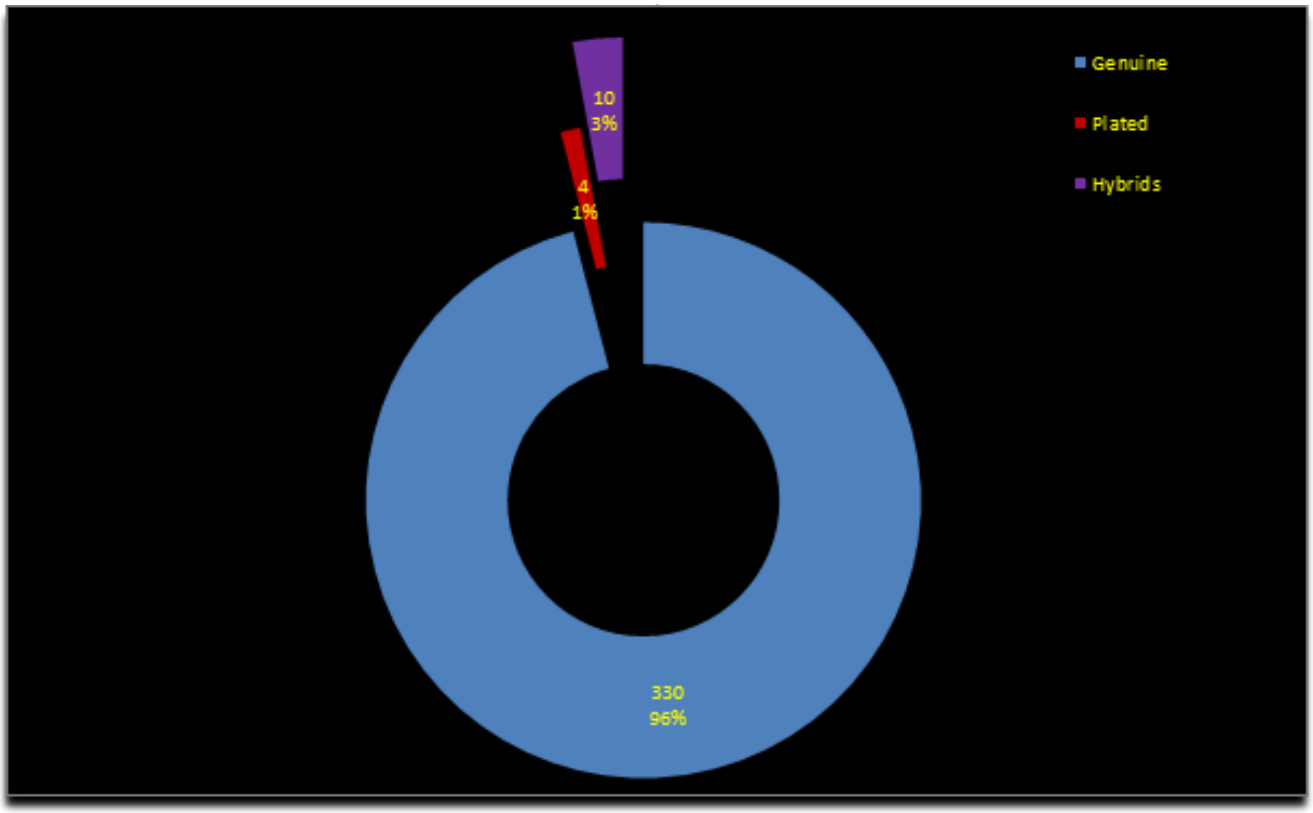


Fig. 25 – Graph of the silver coins from Gorsium-Herculia – number of coins and their proportion on the site;

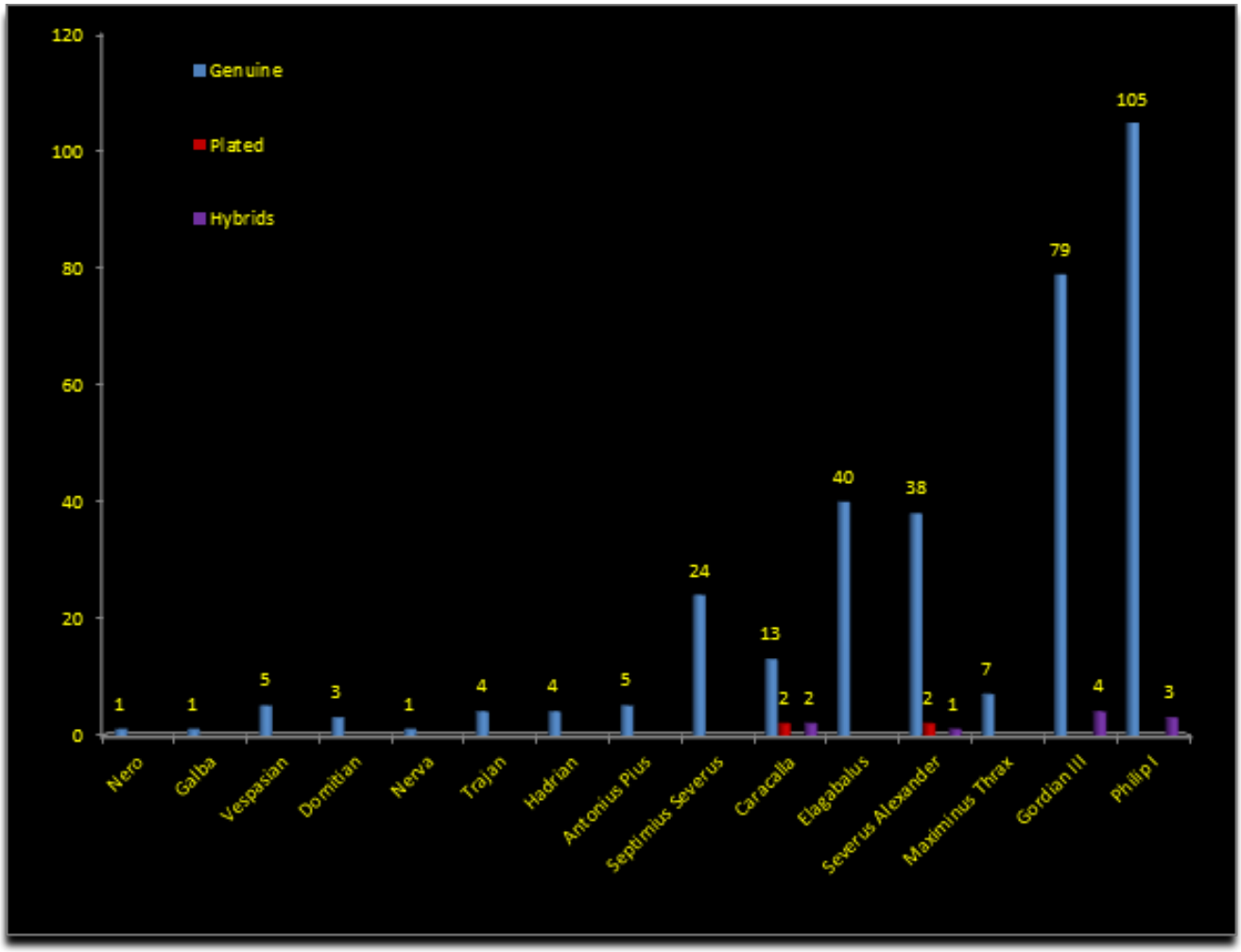


Fig. 26 – Graph of the silver coins from Gorsium-Herculia – number of pieces for each issuer;

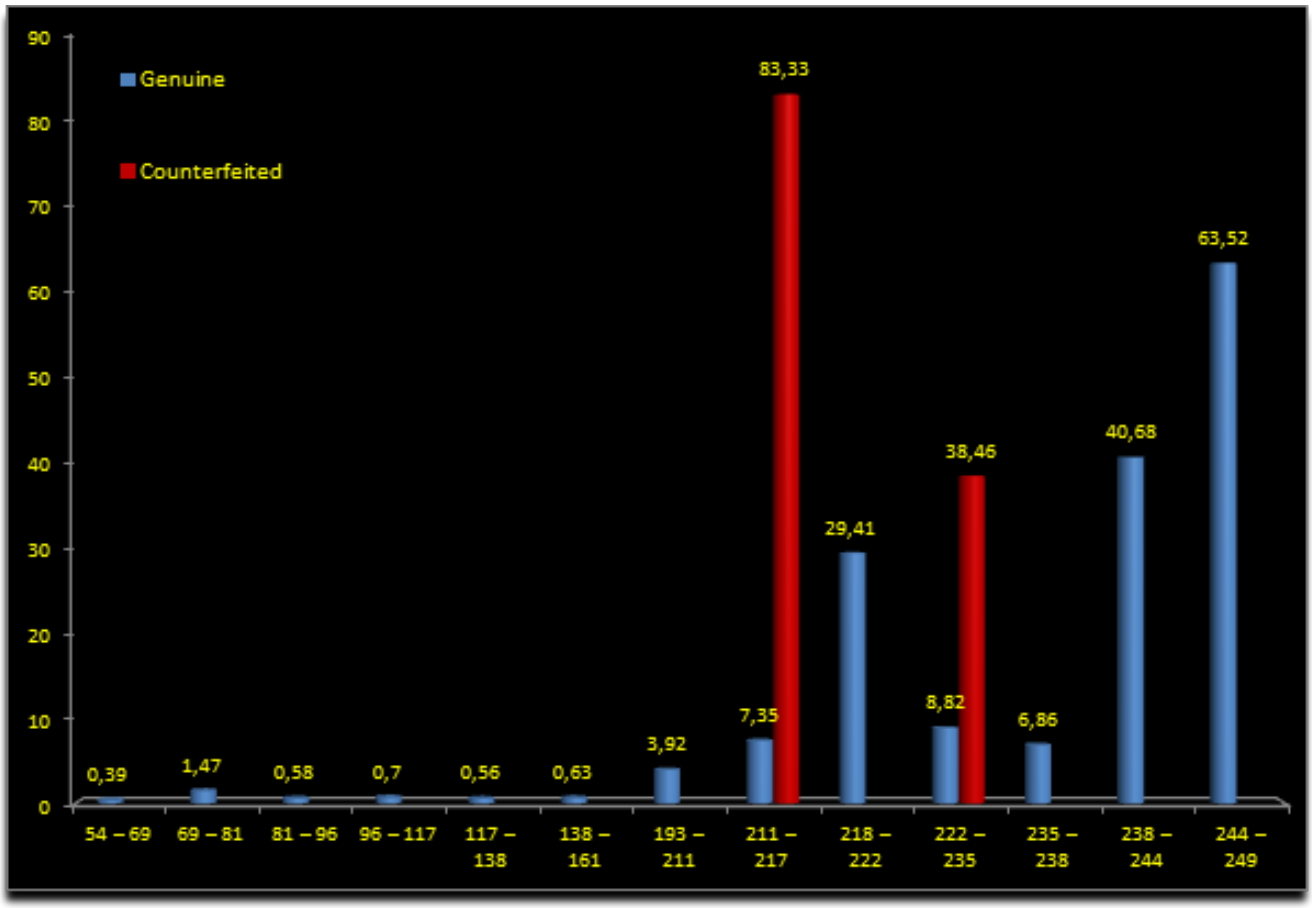


Fig. 27 – Graph of the silver coins from Gorsium-Herculia – monetary index;

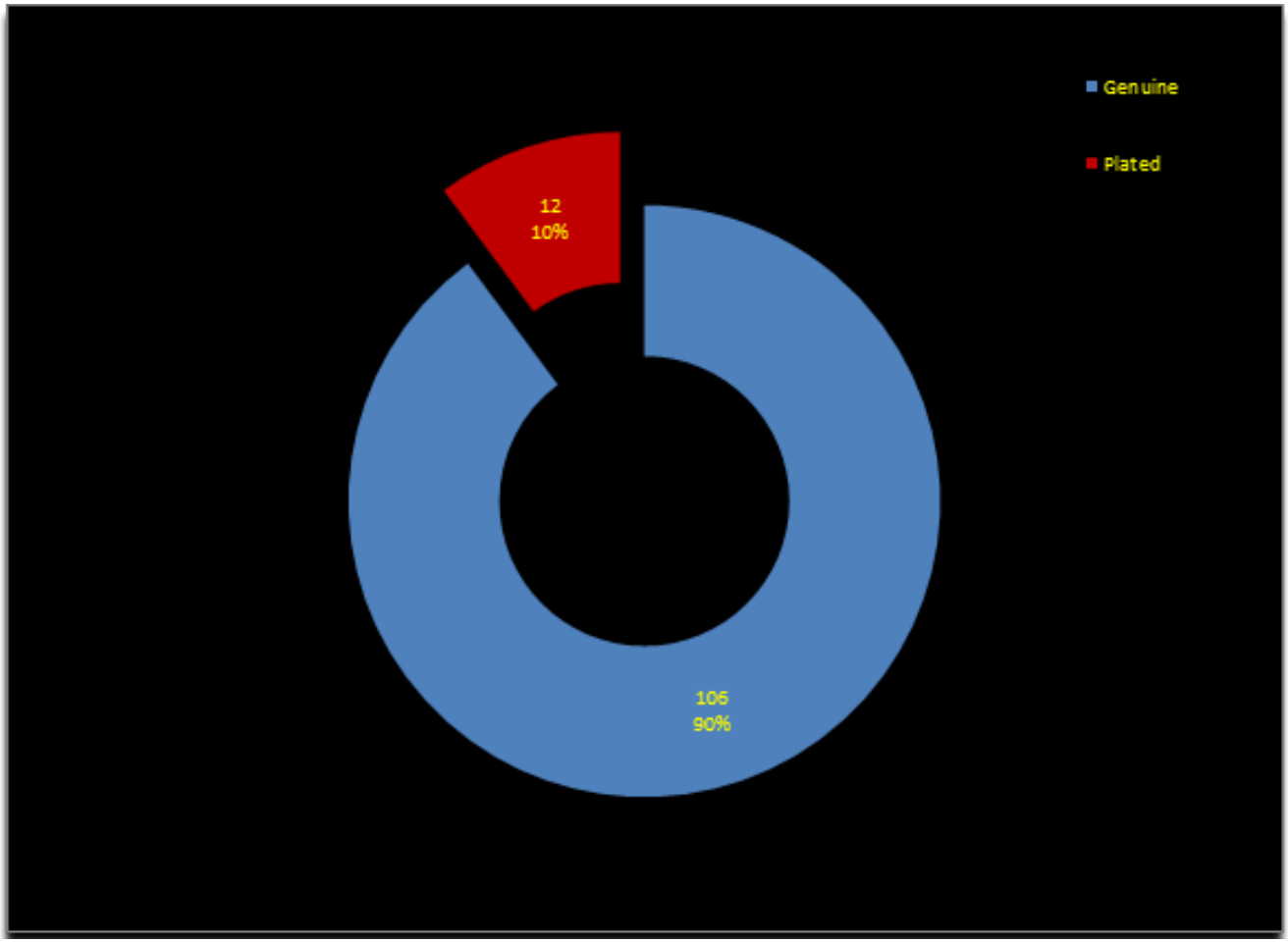


Fig. 28 – Graph of the silver coins from Solva – number of coins and their proportion on the site;

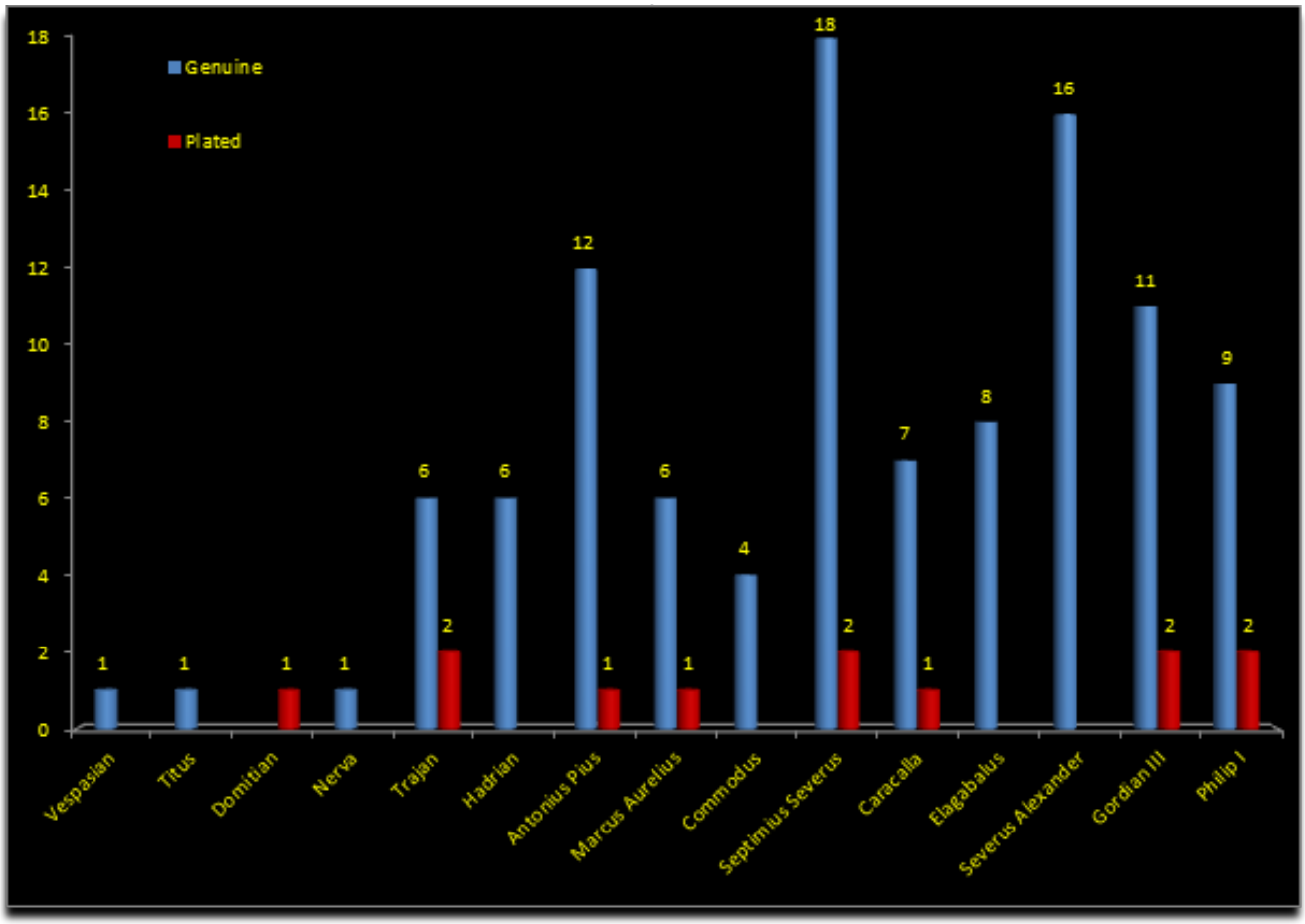


Fig. 29 – Graph of the silver coins from Solva – number of pieces for each issuer;

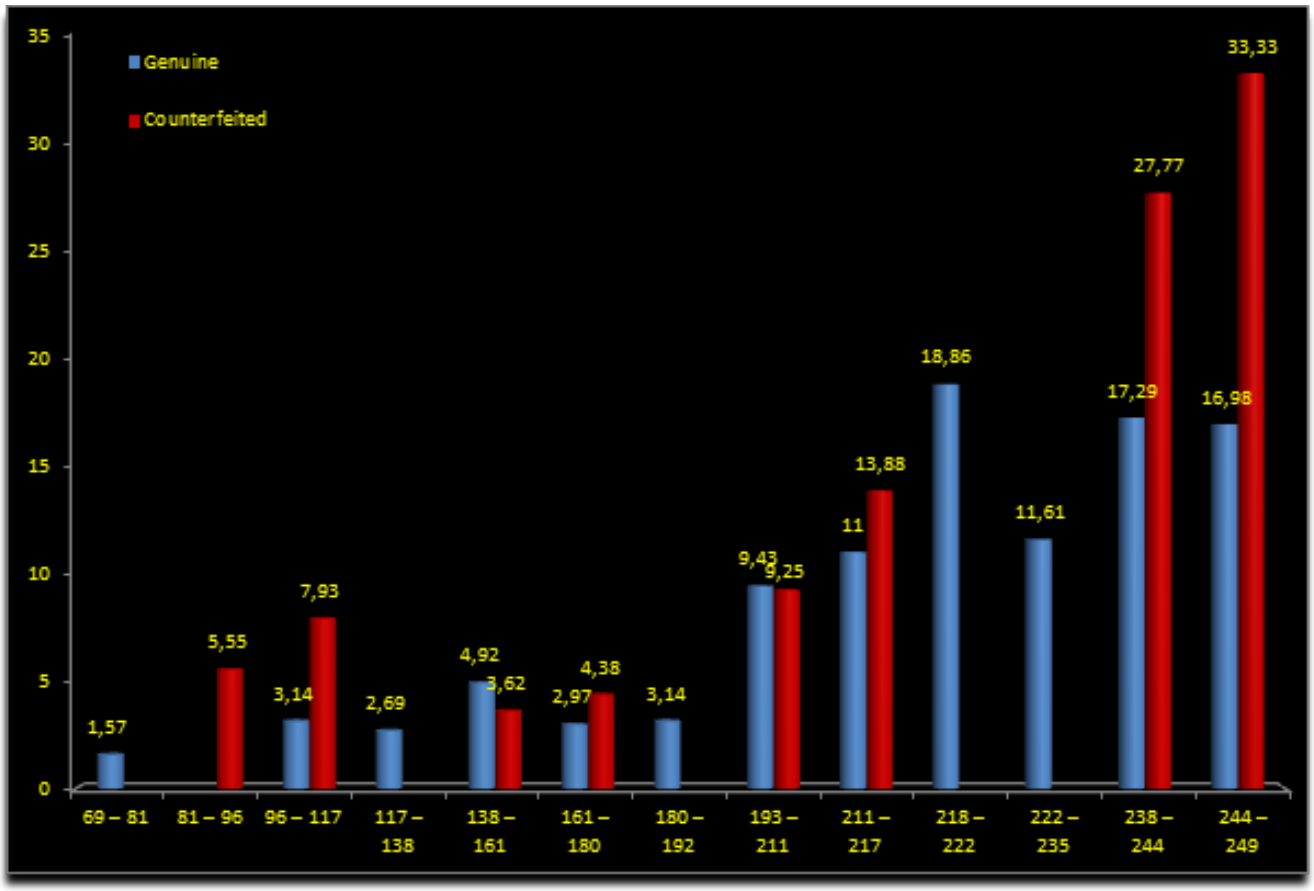


Fig. 30 – Graph of the silver coins from Solva – monetary index;

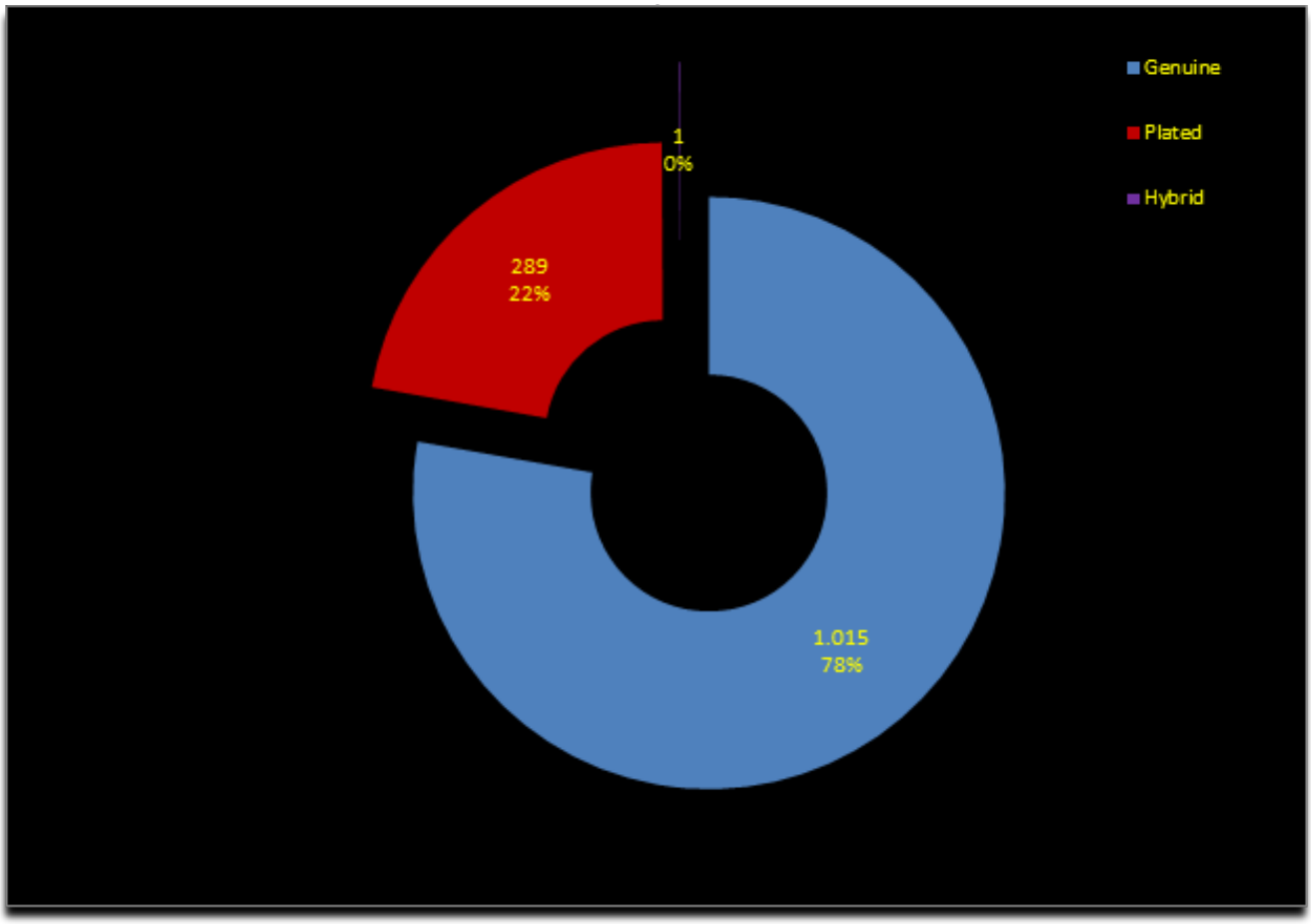


Fig. 31 – Graph of the silver coins from Brigetio – number of coins and their proportion on the site;

Septimius Severus (193-211), Elagabalus (218-222), Severus Alexander (222-235), Gordian III (238-244) and Philip I (244-249). Counterfeit pieces are present with high values in the Severan and Military Anarchy period, very few plated coins dated at the Antonine time.

If we look at (Fig. 33), we can see that during the Antonine period the monetary coefficient is very low. Only from the Severan period it rises in value, the index for counterfeit pieces being larger than that for genuine coins, exception being the period of Elagabalus (218-222) and Philip I (244-249).

Arrabona (Győr, Hungary), a Roman fortress situated on the Pannonian *limes*, represented a key point on the military road from Carnuntum to Brigetio, named most likely after the river Arrabo, a toponymal of Celtic origin[85].

The region was occupied by Romans in the 1st century AD and abandoned during the 4th century AD because of repeated barbarian attacks. A military *castrum* is identified here which had two phases, first constructed from wood and earth and later erected from stone[86], the primary one completed most likely during Claudius (41-54) at the same time with the legionary fortress from Carnuntum[87].

In this location were brought cavalry units, during the first half of 1st century AD here arrived *ala I Pannoniorum*[88], under emperor Hadrian (117-138) was brought *ala I Ulpia contrariorum milliaria*[89] as well, *ala I Augusta Itureorum* and *ala I Arevacorum,* units from Legion I Adiutrix[90] have been identified here as well.

In the case of Arrabona (Fig. 34) there have been identified 342 genuine coins with a proportion of 98,5%, two plated pieces with 1% and one hybrid with 0,5%.

When distributing the coins for each issuer we can see very high values for the second part of I century and first part of II century, especially for the Flavian dynasty, under Vespasian (69-79), Titus (78-81) and Domitian (81-96), and the first part of the Antonine dynasty during Trajan (98-117) and Hadrian (117-138). The next periods are present until Severus Alexander (222-235) but in a very small amount of pieces.

For the monetary coefficient graph (Fig. 36), counterfeited coins were excluded, two pieces are not enough to determine the historical truth. Because of the large numbers of genuine coins, the index for this pieces are trustworthy. Therefore, the main coin distribution on the site took place during the 1st century AD and the beginning of the 2nd century, after this time the infusion of coin goes down in quantity.

On the site from **Ad Mures (Ács, Hungary)** (Fig. 37), there have been discovered 25 silver coins, 19 genuine pieces representing 76% of the total amount of coins and six plated with 24%.

We may observe the distribution of this pieces in (Fig. 38), the majority of coins being dated to the Severan period.

[85] VISY 2003, 68.
[86] FODOREAN 2014, 66.
[87] FODOREAN 2014, 66.
[88] FODOREAN 2014, 66.
[89] FODOREAN 2014, 66.
[90] TPECS 1999, Arrabona.

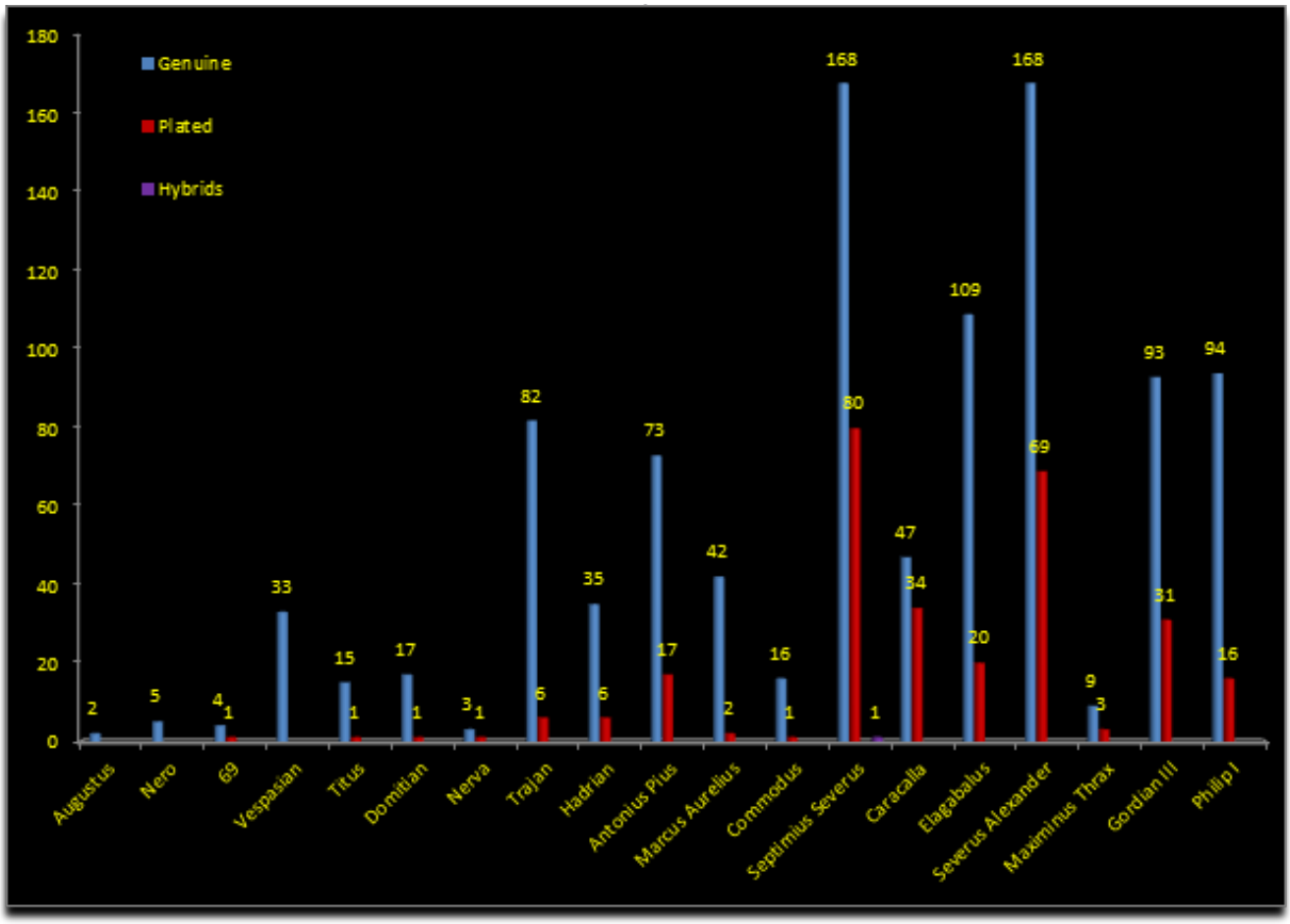


Fig. 32 – Graph of the silver coins from Brigetio – number of pieces for each issuer;

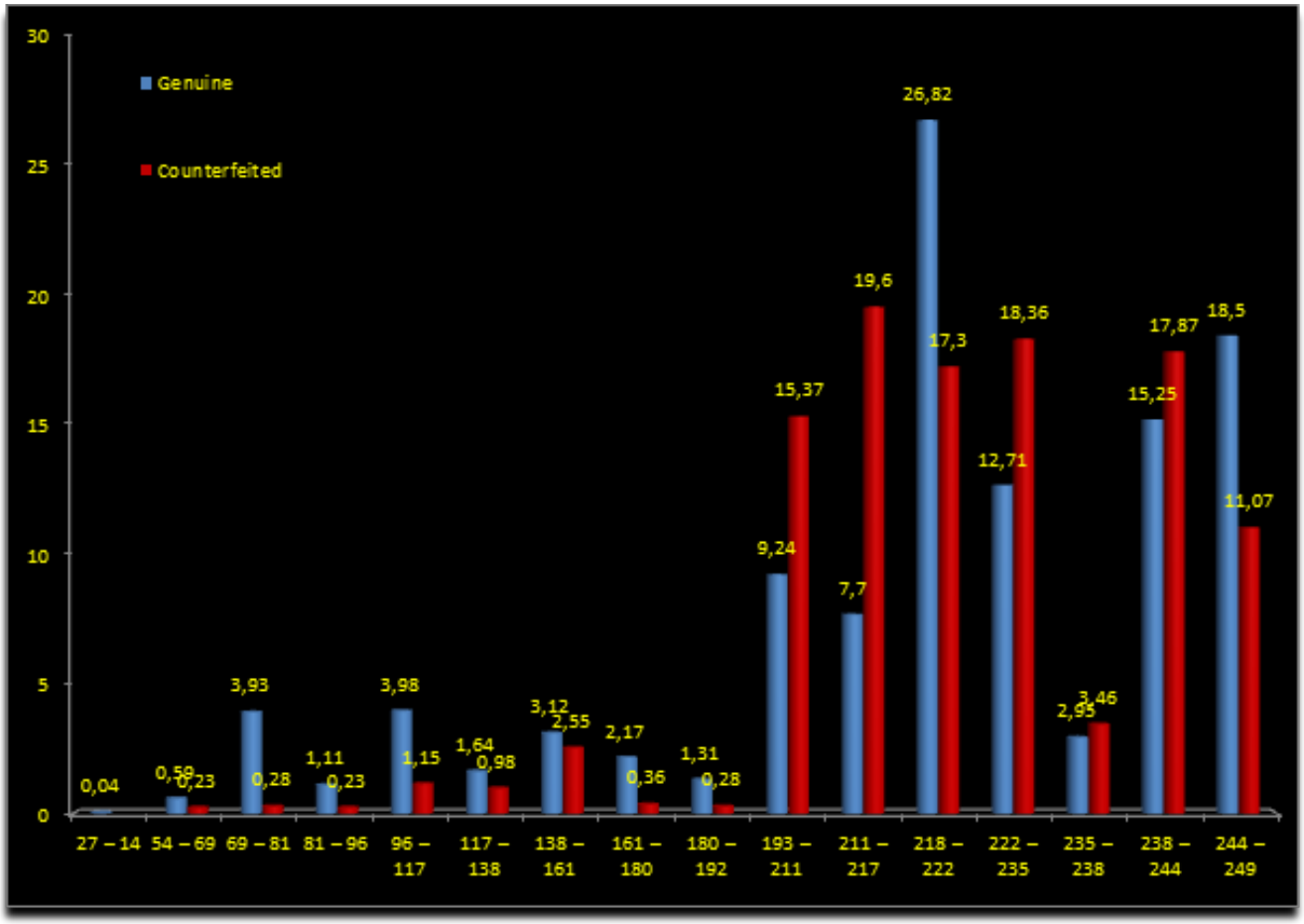


Fig. 33 – Graph of the silver coins from Brigetio – monetary index;

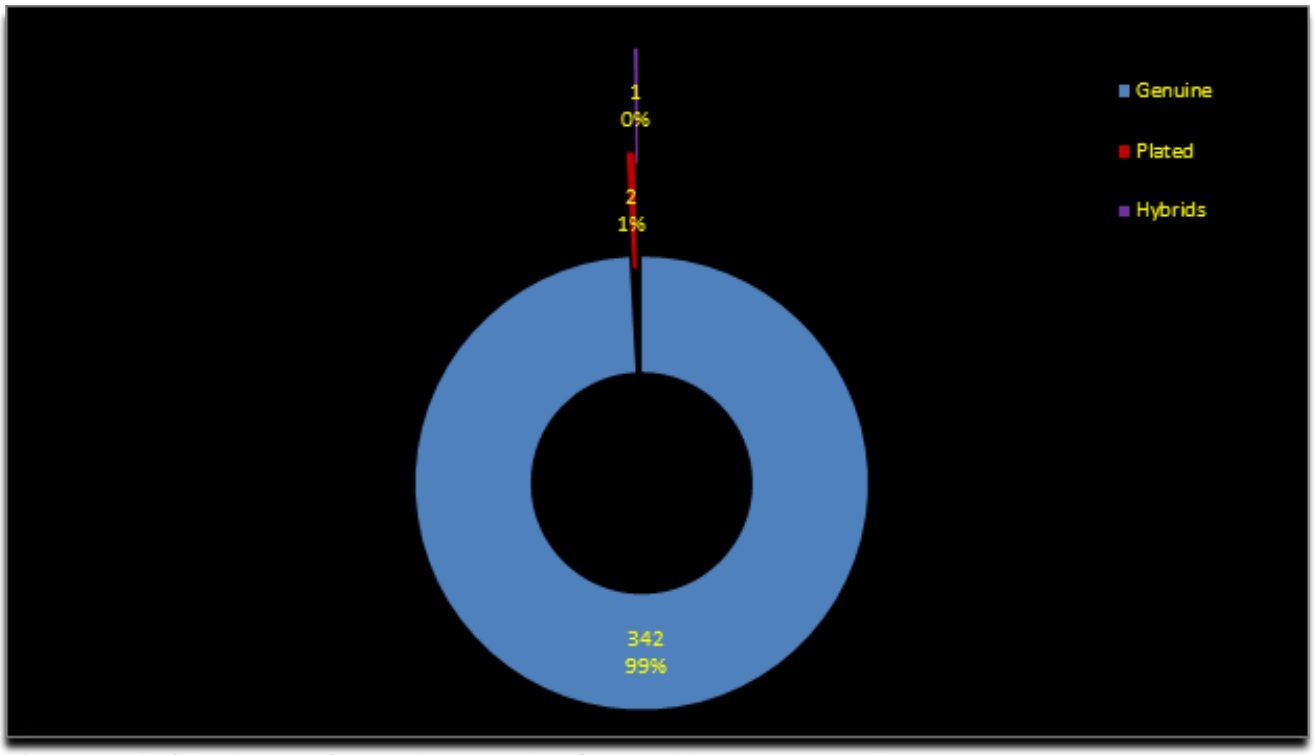


Fig. 34 – Graph of the silver coins from Arrabona – number of coins and their proportion on the site;

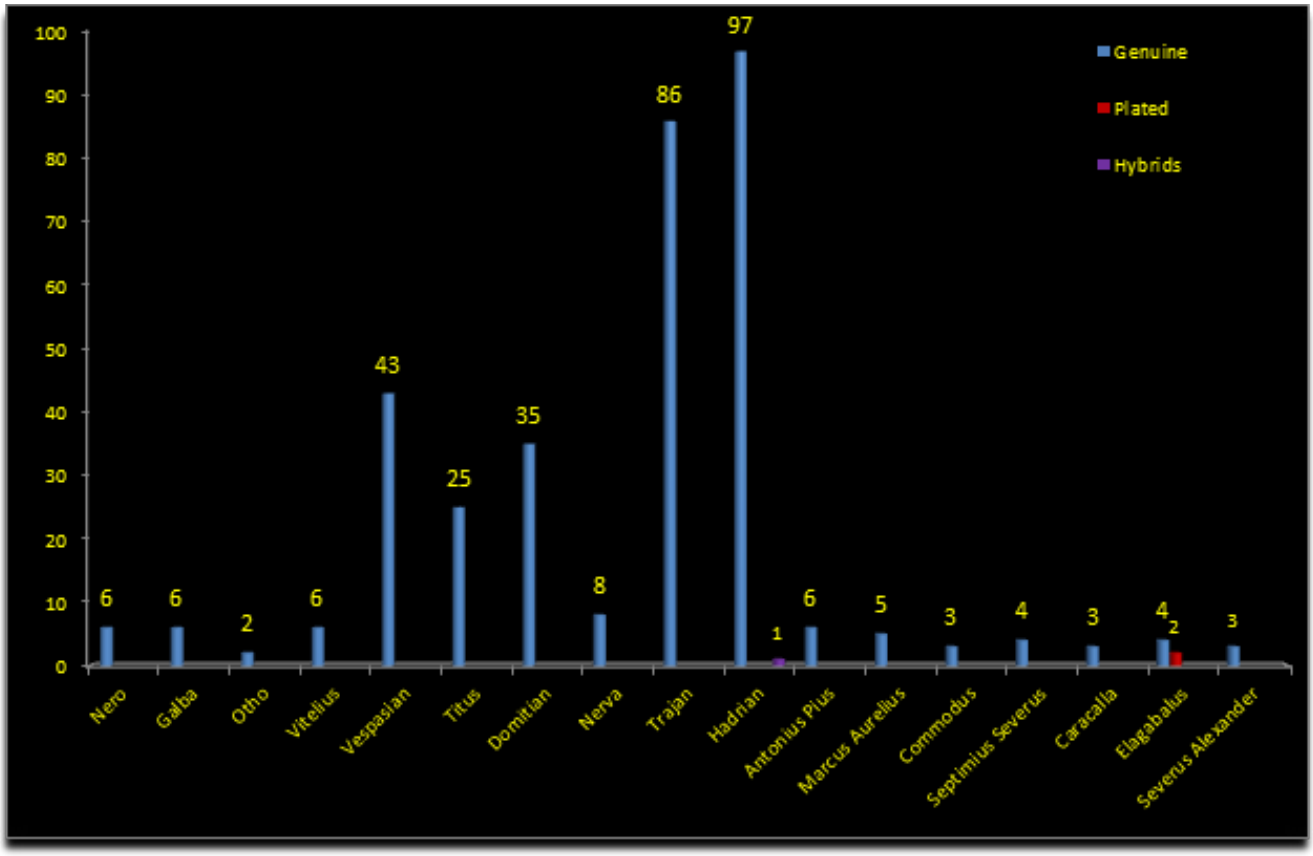


Fig. 35 – Graph of the silver coins from Arrabona – number of pieces for each issuer;

In the case of monetary coefficients (Fig. 39) the available data does not offer a correct view of the situation. Thus, the coefficients for genuine and plated pieces have very high values which are not suitable to represent a realistic situation of the monetary distribution.

Mursella (Mórichida, Hungary) was a Roman town in the vicinity of which a wood and earth made fortress was identified, during the reign of emperor Hadrian (117-138)[91] the town gained the rang of *municipium*, the civil area expanding towards the Roman fortress[92].

[91] FODOREAN 2014, 90.
[92] VISY/NAGY 2003, 222.

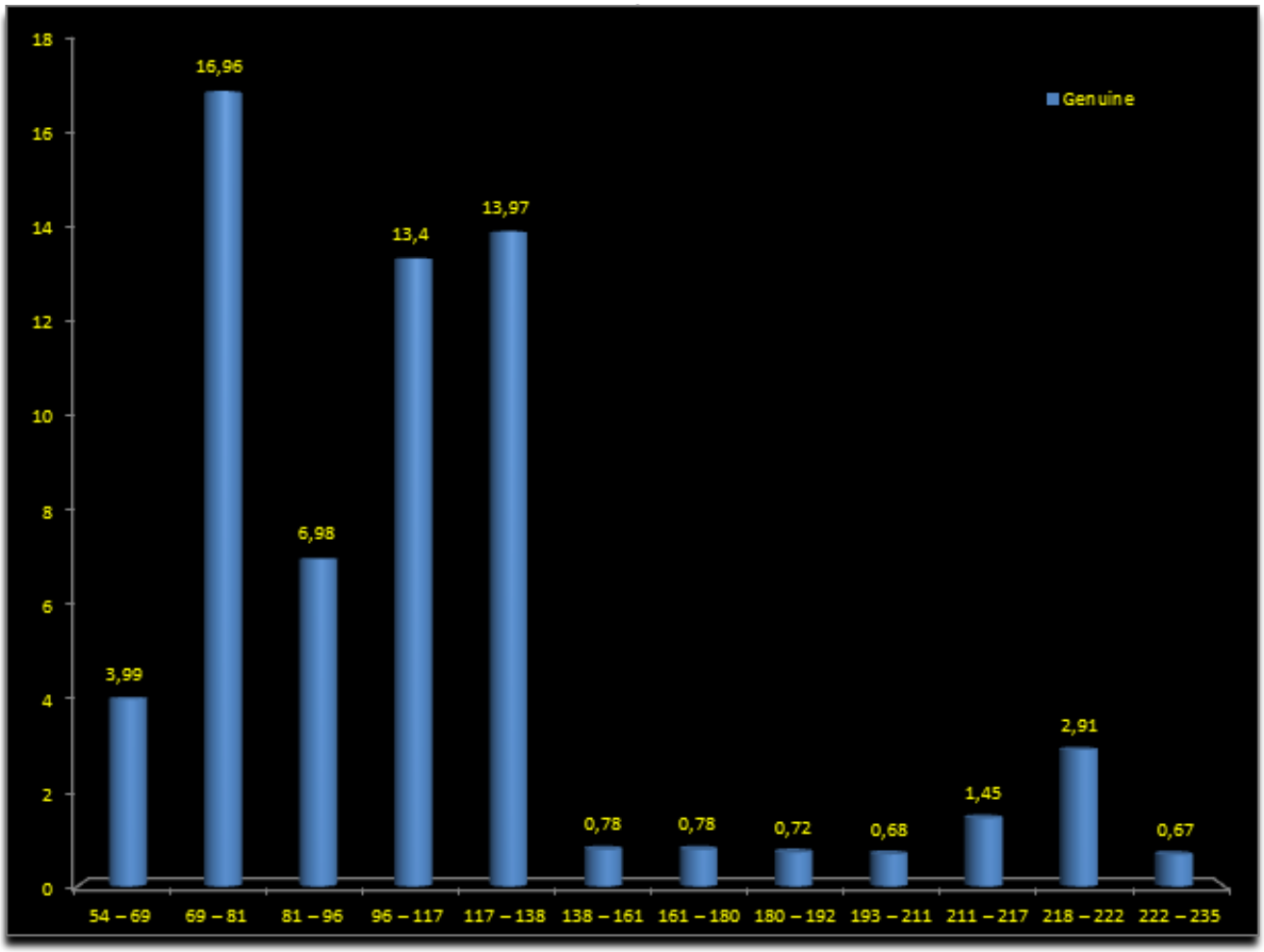


Fig. 36 – Graph of the silver coins from Arrabona – monetary index;

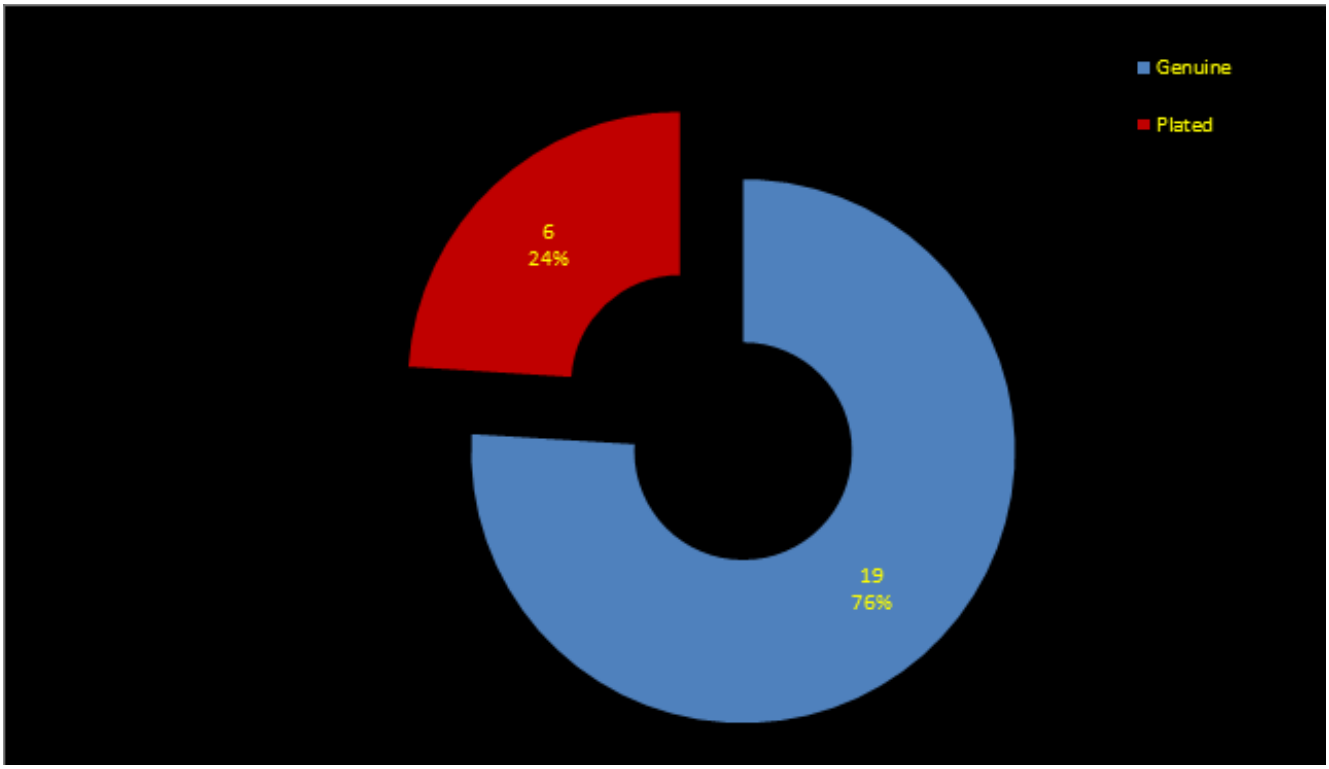


Fig. 37 – Graph of the silver coins from Ad Mures – number of coins and their proportion on the site;

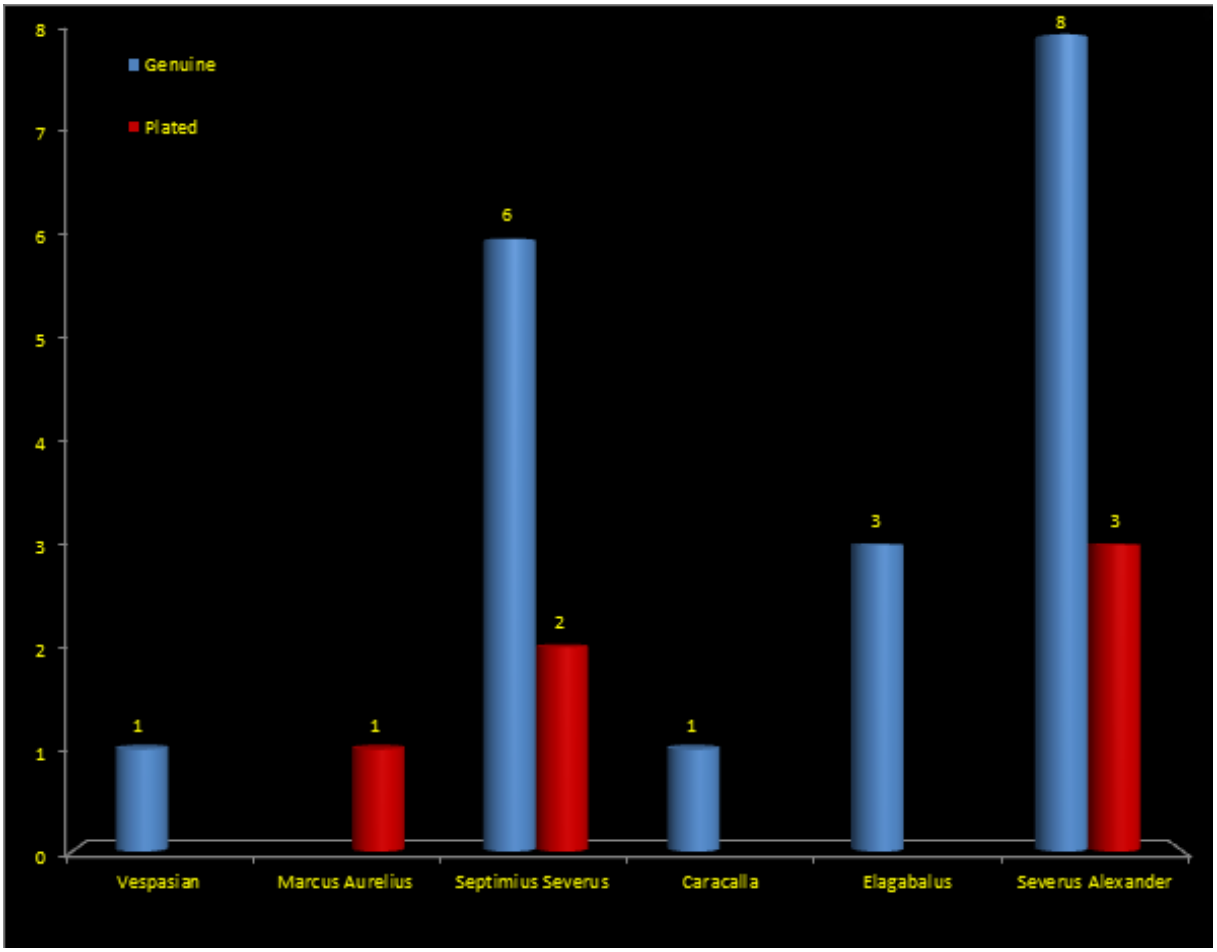


Fig. 38 – Graph of the silver coins from Ad Mures – number of pieces for each issuer;

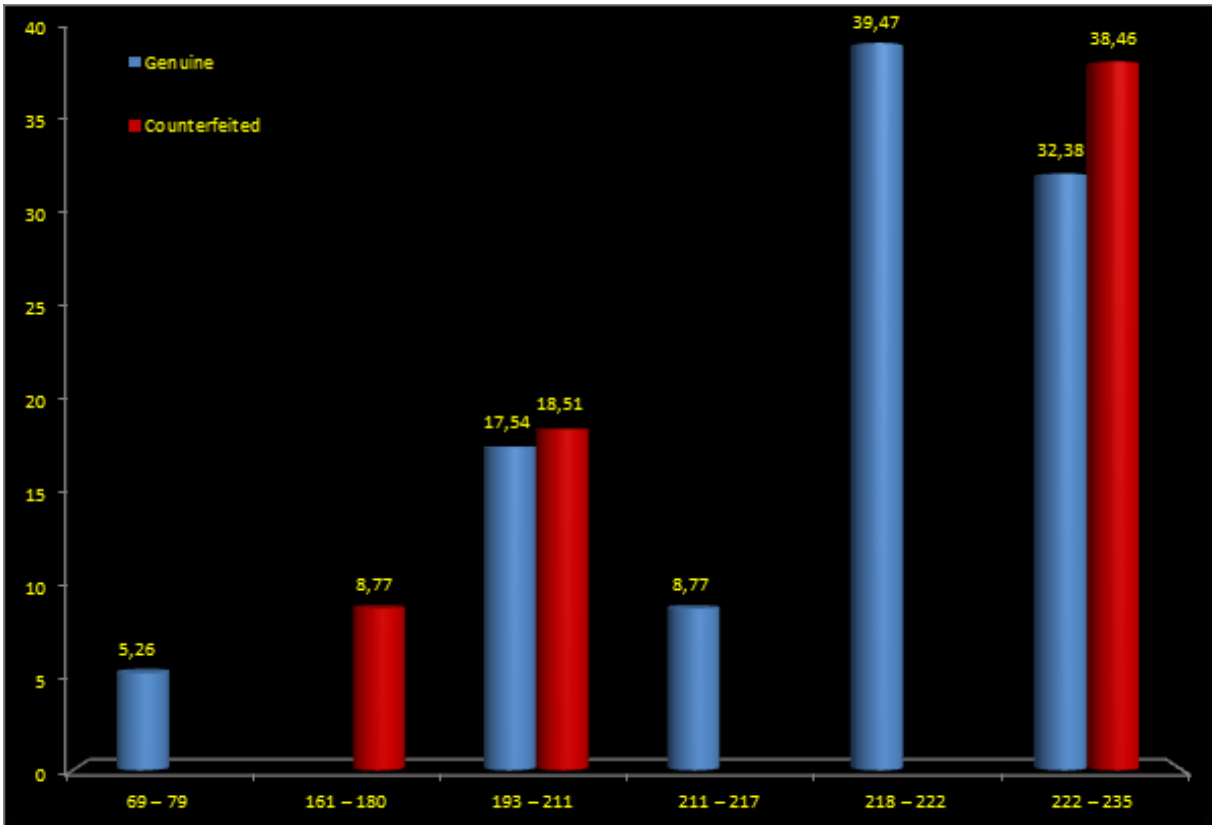


Fig. 39 – Graph of the silver coins from Ad Mures – monetary index;

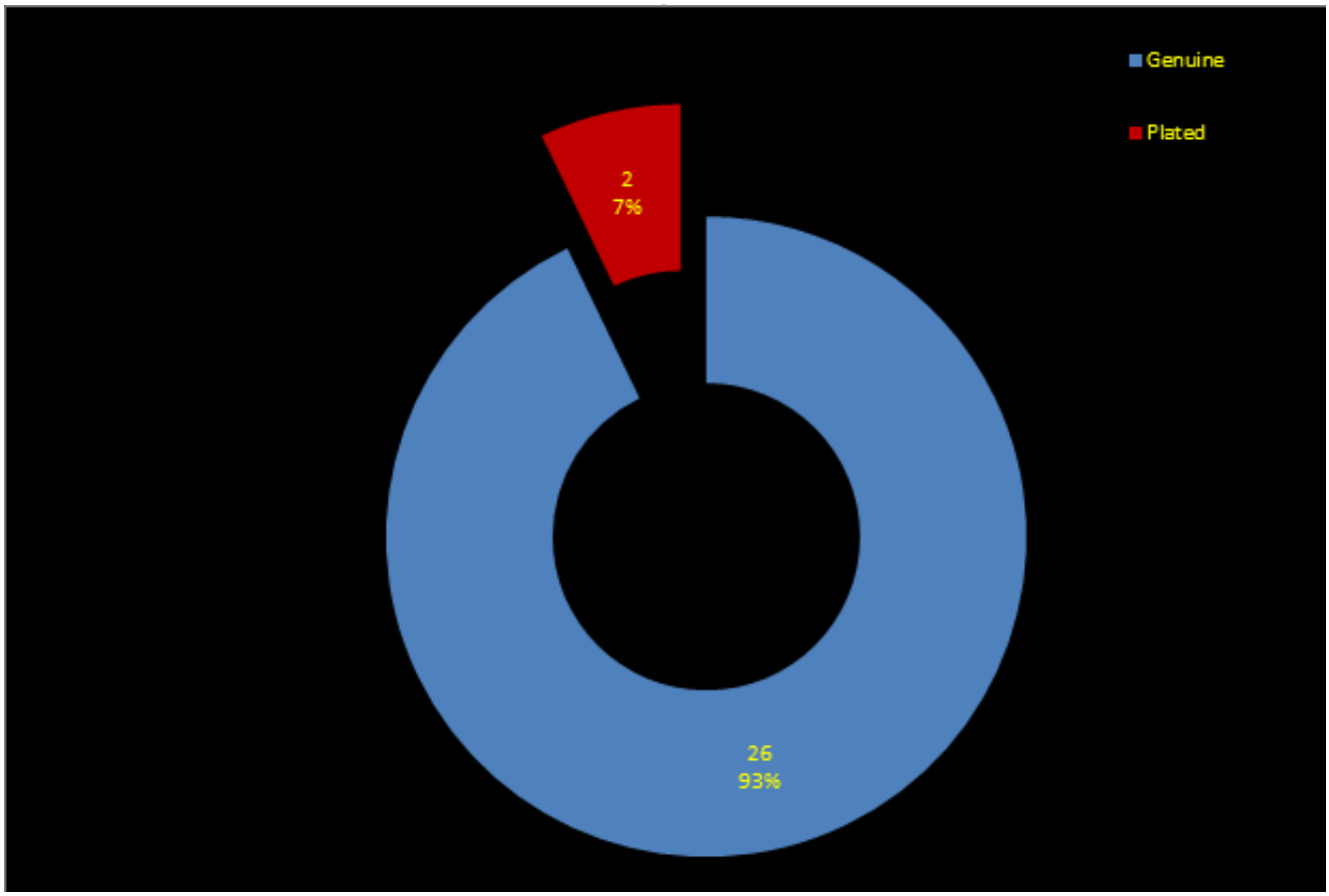


Fig. 40 – Graph of the silver coins from Mursella – number of coins and their proportion on the site;

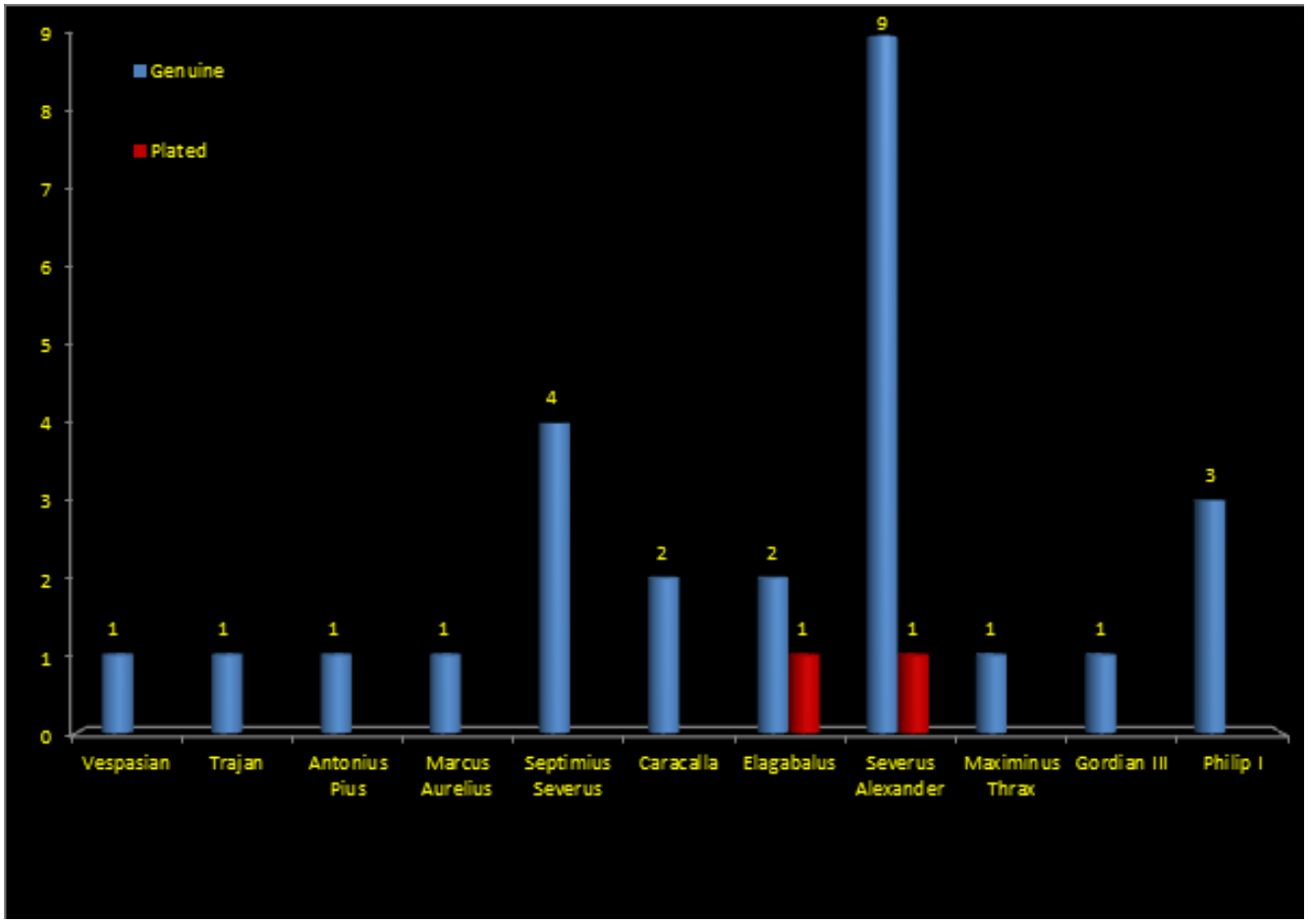


Fig. 41 – Graph of the silver coins from Mursella – number of pieces for each issuer;

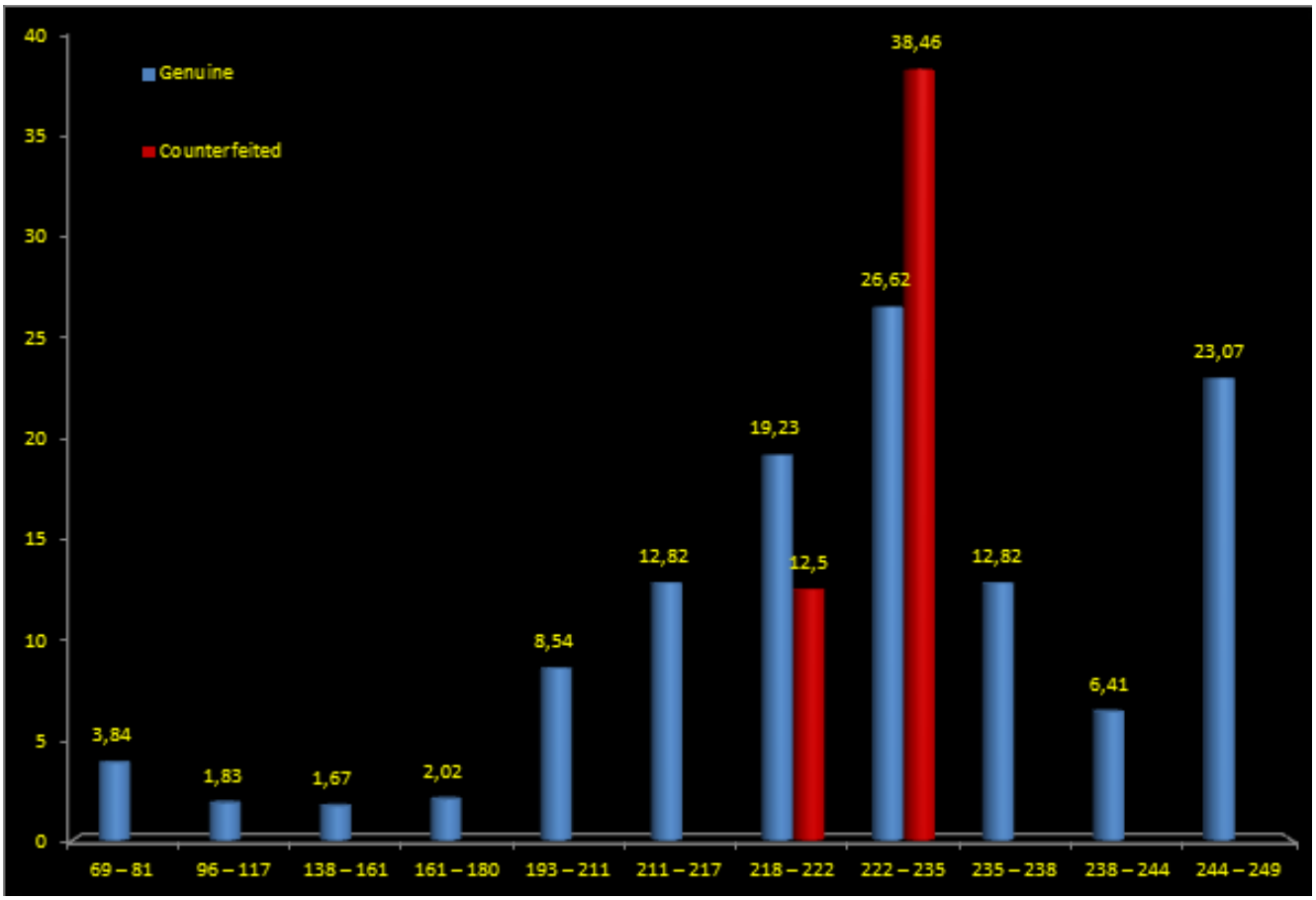


Fig. 42 – Graph of the silver coins from Mursella – monetary index;

At Mursella we find a similar situation with that from Ad Mures, very few silver coins for the period 27 BC to AD 249 have been discovered. In (Fig. 40) we see the 26 genuine coins with form a proportion of 93% and two plated pieces with 7%.

The distribution of the pieces (Fig. 41) spreads from Vespasian (69-79) to Philip I (244-249); the majority of coins were dated as belonging to the Severan time.

Furthermore, in this situation, the graph for monetary index (Fig. 42) is not very useful because of the small amount of identified pieces. Thus the coefficient for genuine coins goes up during the Severan dynasty, down at the beginning of the Military Anarchy and then up again during Philip I (244-249). The index for counterfeit pieces, based just on two pieces, has to high values becoming untrustworthy.

One of the Roman settlements that received the rang of *municipia* under Vespasian (69-79) was **Scarbantia**[93] **(Sopron, Hungary)**. Because of its location plus economic activity, the civil town developed into an active centre, after AD 106 the settlement was updated with new road networks, a forum, public wells and an amphitheatre[94].

This period of development continued until the Marcomannic Wars (167 – 180) when the town was looted more than once by barbarians[95]. Here were stationed many troops, during the Constantine dynasty the city centre was fortified with a stone wall equipped with towers and firing platforms[96].

[93] TPECS 1999, Scarbantia.
[94] TPECS 1999, Scarbantia.
[95] TPECS 1999, Scarbantia.
[96] TPECS 1999, Scarbantia.

The graph from Scarbantia represented in (Fig. 43), has a very small numismatic evidence from the 1st until the middle of the 3rd century, only 13 genuine silver coins have been discovered.

Those pieces have been distributed depending on the issuer (Fig. 44) (Fig. 45), but we cannot establish the monetary distribution on the site because of the scarce quantity in material.

Thanks to a *praefectus alae* named Velleius Paterculus, **Carnuntum (Petronell-Carnuntum** and **Bad Deutsch-Altenburg, Austria)** was first mentioned in AD 6 as a Celtic settlement[97]. The Roman presence in this area was first noticed during the reign of Augustus (27 BC – AD 14) when he was trying to create the Roman province of Germania[98].

Legion XV Apollonia constructed the first permanent fortress from Carnuntum under emperor Claudius (41-54)[99]. The Legion, after constructing the first fort out of wood and earth, garrisoned this area until the beginning of the 2nd century and erected the stone phase of the fort. During the Antonine or Severan period Legion XV Apollonia was replaced by Legion XIII Gemini that will remain here until late antiquity[100].

Once the legionary fortress was erected, many civilians flogged the area forming the *canabae* of the fortress. To the south at about 1,3 km from the legionary fortress another auxiliary *castrum* was constructed, first out of earth and later from stone, that was garrisoned by successive units like *ala*

[97] GĂZDAC/HUMMER/POLLHAMMER 2014, 13.
[98] GĂZDAC/HUMMER/POLLHAMMER 2014, 13.
[99] GĂZDAC/HUMMER/POLLHAMMER 2014, 14.
[100] GĂZDAC/HUMMER/POLLHAMMER 2014, 15.

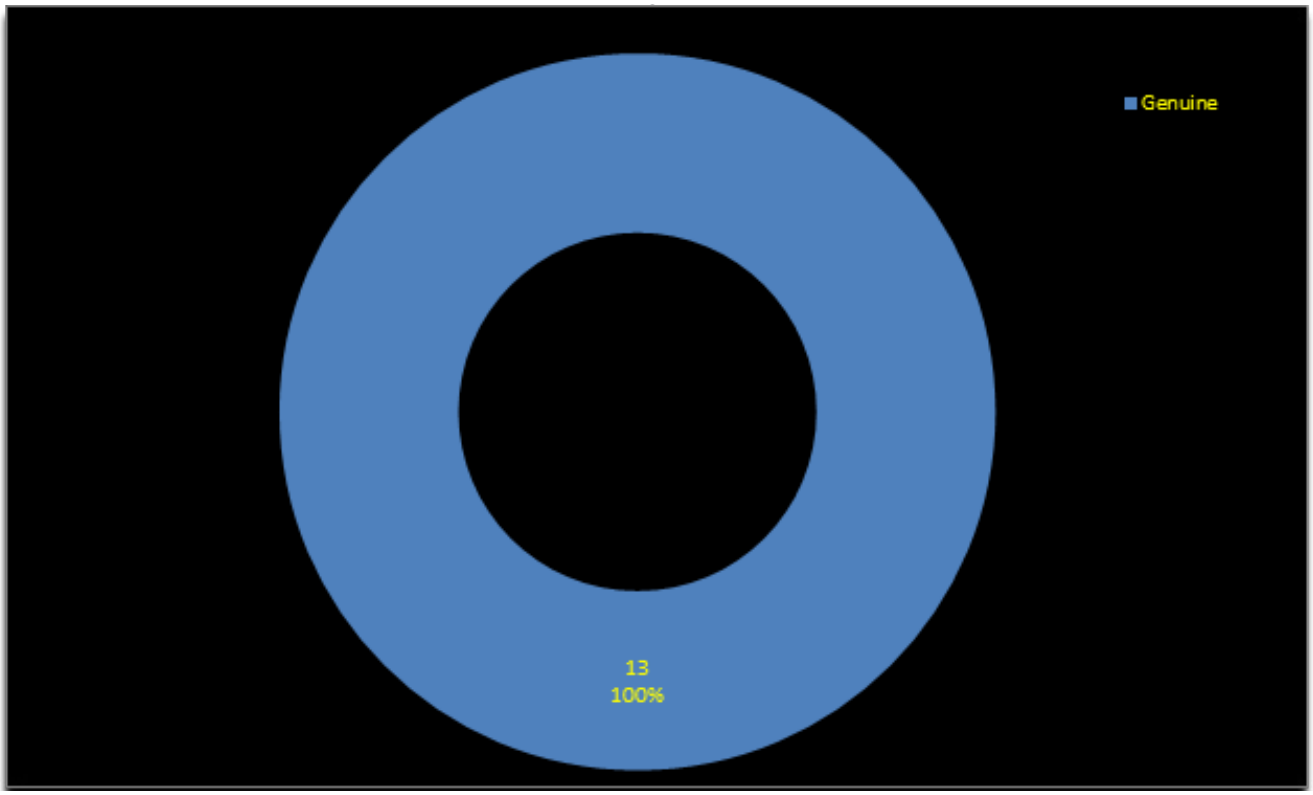


Fig. 43 – Graph of the silver coins from Scarbantia – number of coins and their proportion on the site;

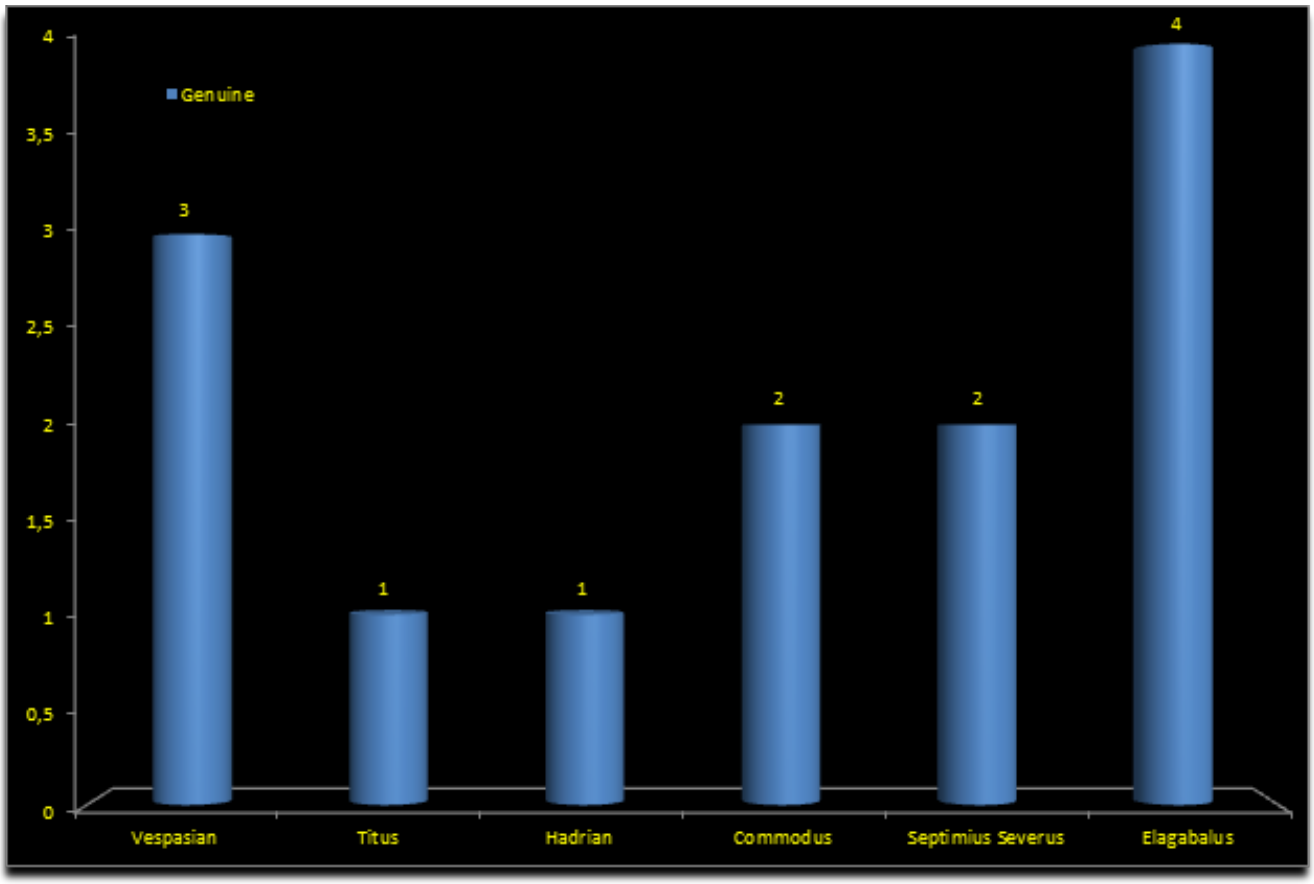


Fig. 44 – Graph of the silver coins from Scarbantia – number of pieces for each issuer;

I Hispanorum Aravacorum, ala I Tungrorum Frontoniana, ala I Pannoniorum Tampiana, ala III Augusta Thracum sagittaria and *ala I Thracum victrix*[101].

The civil town from Carnuntum, situated at 2,2 Km

[101] GĂZDAC/HUMMER/POLLHAMMER 2014, 16.

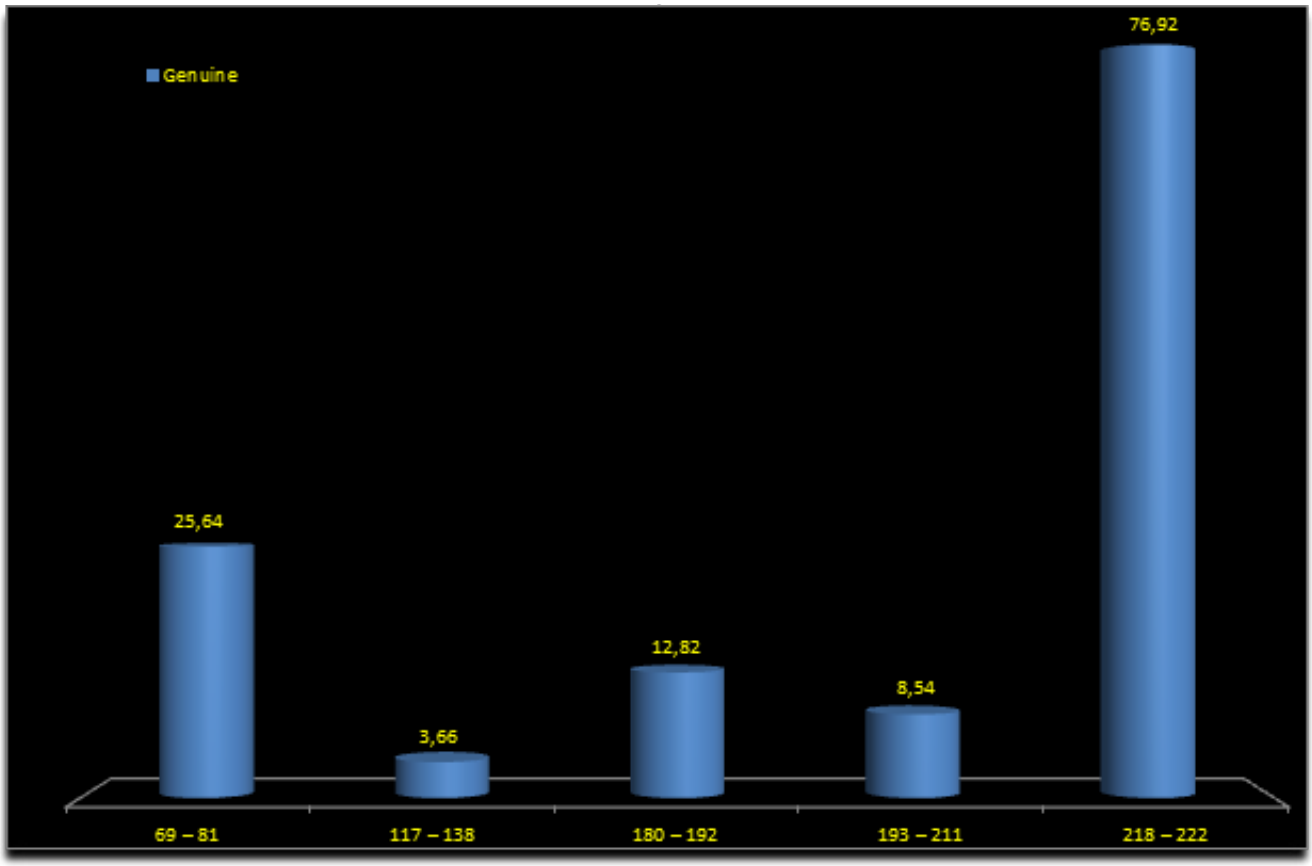


Fig. 45 – Graph of the silver coins from Scarbantia – monetary index;

south from the legionary fortress, was formed in the 1st century AD and transformed during the reign of Trajan (98-117) into the headquarters for the imperial governor of Pannonia Superior. The title of *municipium* was accorded in AD 121 followed by a "Golden Age" for the period of Hadrian (117-138) and Antonius Pius (138 – 161). During the Marcomannic Wars the prosperity temporarily stopped, Carnuntum becomes the supreme headquarters of Marcus Aurelius (161-180), the place from where all the military campaigns against barbarians from north of the Danube were coordinated[102].

After the assassination of Commodus (180-192) the military troops situated on the Danube and Rhine proclaimed Septimius Severus (193-211) as emperor, the former governor of Pannonia, Carnuntum and Aquincum receiving the rank of *coloniae*. Thus follows a new period of prosperity for the legionary fortress, *canabae* and civil settlement, a stone wall was erected for the town and many more building being constructed.

On 11 of November AD 308, the future of Rome was decided at Carnuntum where Diocletian, Maximianus and Galerius meet for establishing the foundation of the Tetrarchy[103]. While other Roman provinces were abandoned by the Romans, Carnuntum continues to prosper during the III and IV centuries[104]. Around AD 355 the city was hit by an earthquake that would damage much of the civil area, while in AD 375 emperor Constantin II arrives with fresh troops for his wars against the barbarians.

[102] GĂZDAC/HUMMER/POLLHAMMER 2014, 18.
[103] GĂZDAC/HUMMER/POLLHAMMER 2014, 21.
[104] GĂZDAC/HUMMER/POLLHAMMER 2014, 21.

Slowly the city starts to be abandoned, a big part of the population moving back to Italy, the final blow for the Roman dominance in the area coming in AD 433 when the whole region is invaded by the hordes of Attila the Hun.

At Carnuntum (Fig. 46), it was possible to identify 4.105 genuine silver coins with a proportion of 80%, 780 plated pieces with 15%, 206 plated hybrids representing 4% and 52 hybrids with 1%.

In (Fig. 47) is possible to see all these coins spreading from Augustus (27 BC-14AD) to Philip I (244-249), the highest values being during the period of Vespasian (69-79), for the Flavian period, under Trajan (98-117), Hadrian (117-138), Antonius Pius (138-161), Marcus Aurelius (161-180) and Commodus (180-192), for the Antonine time, during Septimius Severus (193-211), Elagabalus (218-222) and Severus Alexander (222-235) at the Severan dynasty and Gordian III (238-244) with Philip I (244-249) for the beginning of the Military Anarchy. Furthermore, we can see a concentration of counterfeited coins during the Severan period.

The correct distribution of this coins (Fig. 48), presents a steady rhythm for the genuine pieces between Augustus (27 BC – AD 14) and Commodus (180-192), the index for counterfeited pieces following close by. With the start of the Severan dynasty and into the Military Anarchy, the coefficient for counterfeited pieces gains very high values which decrees in intensity with the beginning of the Military Anarchy period. The only times when the index for genuine pieces is larger than the counterfeited one is under Elagabalus (218-222) and Philip I (244-249). In the case of Caracalla (211-217) the only present coefficient is the one

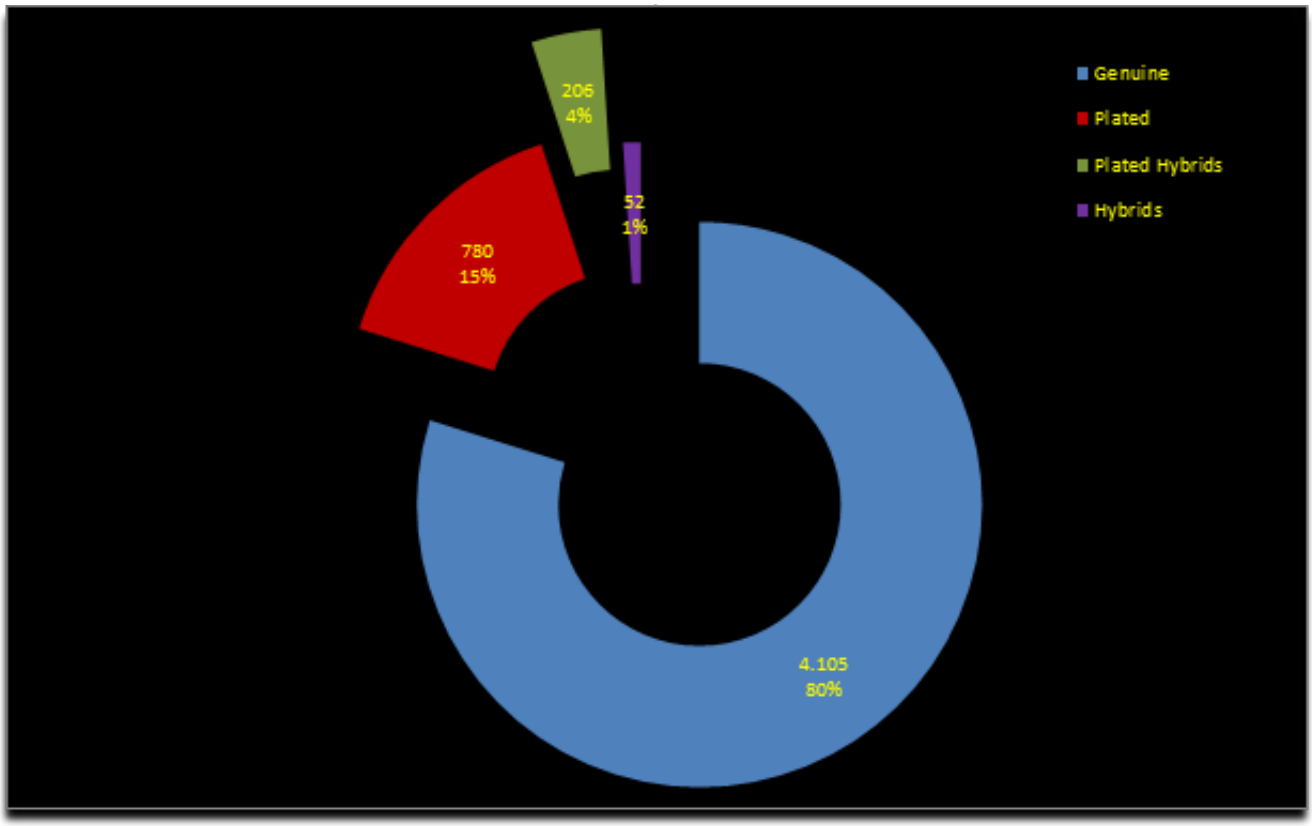


Fig. 46 – Graph of the silver coins from Carnuntum – number of coins and their proportion on the site;

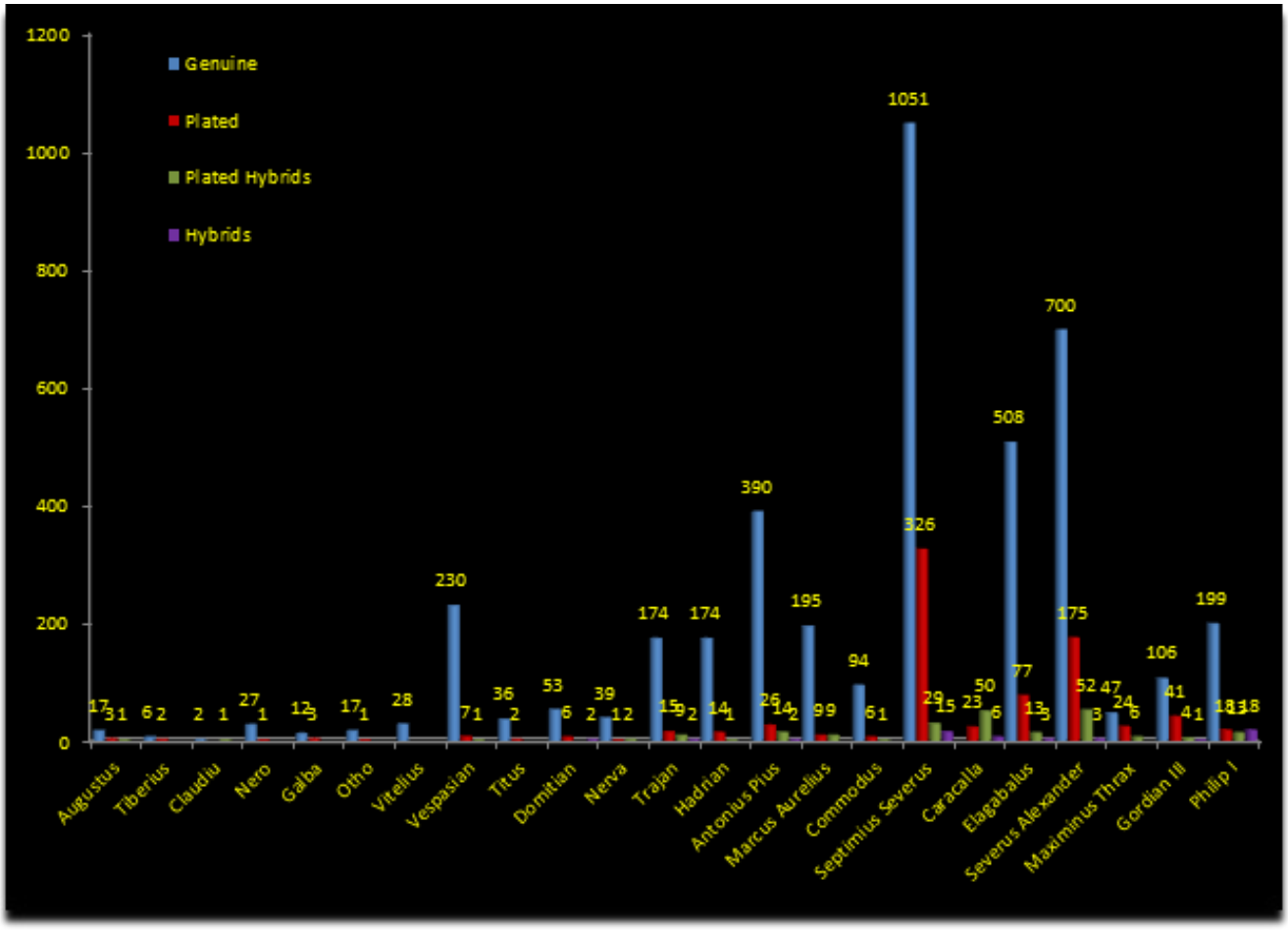


Fig. 47 – Graph of the silver coins from Carnuntum – number of pieces for each issuer;

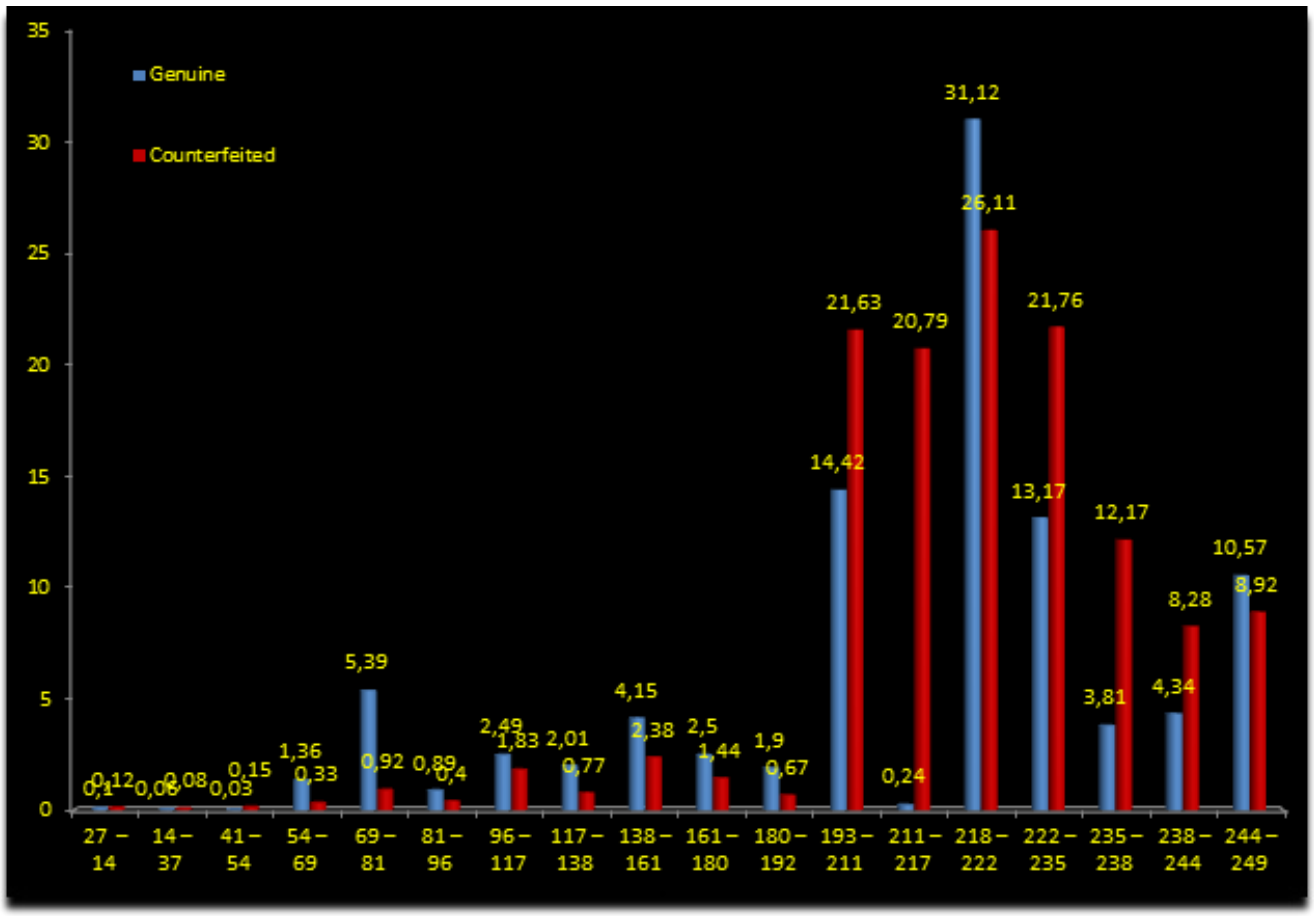


Fig. 48 – Graph of the silver coins from Carnuntum – monetary index;

for counterfeited coins, due to the small amount of genuine pieces.

The general and compared monetary index – Dacia and Pannonia

If we compile the monetary index graphs from all of the sites, we can see the situation of monetary distribution for the province. First were made graphs with the index of the genuine coins (Fig. 49) for Dacia and (Fig. 50) for Pannonia, followed by graphs representing the index of counterfeit pieces (Fig. 51) for Dacia and (Fig. 52) for Pannonia.

In the case of genuine coins from Dacia (Fig. 49), the monetary coefficients from the sites start with high values during the Flavian period, more exactly under Vespasian (69-79) and Titus (79-81).

For the second part of the Flavian time, during Domitian (81-96) the index decreases in value, following a rise and a constant rhythm during the "five good emperors", more exactly Nerve (96-98), Trajan (98-117), Hadrian (117-138), Antonius Pius (138-161) and Marcus Aurelius (161-180), index that will decrease again under Commodus (180-192).

With the start of the Severan dynasty, the coefficients increase sizeably, first ascent of the index under Septimius Severus (193-211) followed by a decrease during Caracalla (211-217) and a new increase dated at Elagabalus (218-222) and Severus Alexander (222-235). For the period of 235 – 238 all the coefficients go down in value, recovering later under Gordian III (238-244) and Philip I (244 – 249) to a set of values similar with those from the Antonine time.

In the case of genuine pieces from Pannonian sites (Fig. 50), some differences are seen. First of all, at Carnuntum the monetary coefficient is starting to show its presence from the time of Augustus (27 BC – AD 14) while on the rest of the sites, with the exception of that from Brigetio where two other coins from Augustus have been identified, the beginning of the graphs are dated to Nero (54-68).

Next follows the period from 69 to 192 when the majority of coefficients have a constant rhythm, only Arrabona improves in intensity for the time Vespasian (69-79) and Titus (79-81), drops a little under Domitian (81-96) and rises again for Trajan (98-117) and Hadrian (117-138), followed by a decrease in intensity to the normal rate like the rest of the sites.

During Septimius Severus (193-211) the majority if index increase in size depending on the sites, some record a rise in value during Septimius Severus (193-211) and until Elagabalus (218-222) while other like Carnuntum record a drop in value under Caracalla (211-217), Arrabona has just a small increase for Elagabalus (218-222) after witch its coefficient stops at la Severus Alexander (222-235).

From Severus Alexander (222-235) all the sites show a drop in their monetary index, drop that carries on to Maximinus Thrax (235-238). After the fall of the index follows a rise in value during emperors Gordian III (238-244) and Philip I (244-249), the majority of coefficients go up.

The highest value is reached by the site from Gorsium which in this historical period is witnessing an administrative rebirth under the name of Herculia. Next to that, following in terms of value are Intercisa, Brigetio and Solva, the lowest value being at Carnuntum where just a small increase of the

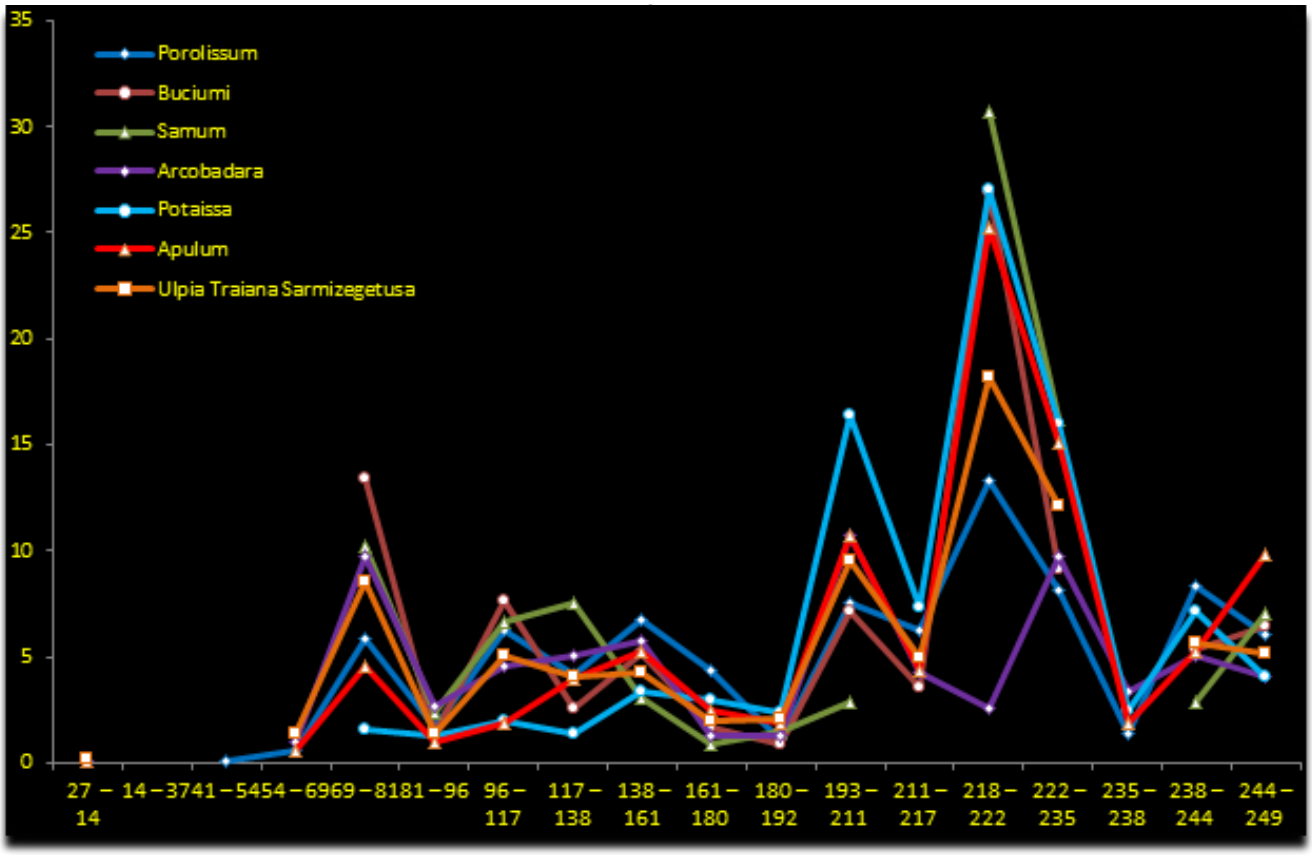


Fig. 49 – Graph with index of genuine coins on sites from Dacia;

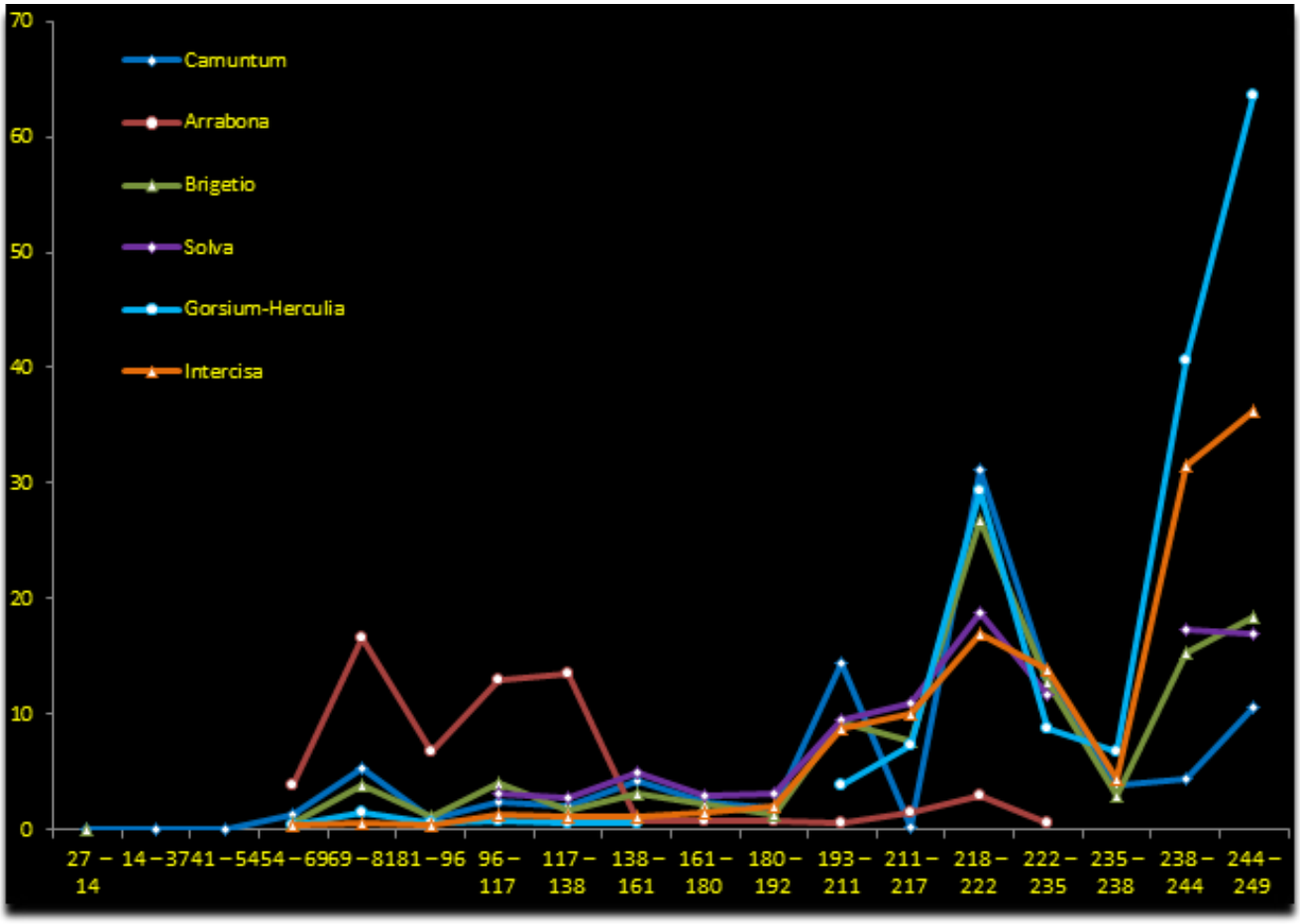


Fig. 50 – Graph with index of genuine coins on sites from Pannonia;

coefficient is recorded under Philip I (244-249).

It is important to specify that in the case of sites like Scarbantia, Ad Mures or Mursella, because of the small amount of identified coins for this period, the results do not give a correct interpretation of the sites, thus were not taken into account when establishing this graph.

Next interpretation is for counterfeit pieces from Dacia (Fig. 51). As we can see the starting point for all of these sites is during the Flavian period, more exactly under Vespasian (69-79) and Titus (79-81).

This fact is also supported by the well-known monetary reform from the time of Domitian (81-96)[105] when the quantity of silver from denarius is reduced from 950‰ to approximately 900‰[106].This way old coins were melted in order to provide base material for newly minted ones, this situation being seen by the lack of counterfeit coins dated previous to the reign of Vespasian (69-79) in Dacia. Without having any genuine models, the counterfeited coins were not possible to produce.

For the period 69 – 192 the index on all the sites is maintained at a steady level. During Septimius Severus (193-211) however, the coefficients have very high values for all the sites. The Severian period is a highlight for many indexes, many sites reach their top value during Septimius Severus (193-211), Buciumi, Porolissum and Arcobadara, or under Caracalla (211-217) this being the case at Potaissa or under Elagabalus (218-222) the case of Apulum.

During Severus Alexander (222-235) and Maximinus Thrax (235-238) the coefficients go down in value, but go up again just as the Military Anarchy is settling in, best represented at Samum and Ulpia Traiana Sarmizegetusa.

When it comes to counterfeit silver coins from sites located in Pannonia, graph (Fig. 52) shows the best situation. Firstly, the sites that had to few counterfeited pieces were excluded from the overall graph in order to not influence in a bad way the overall result. After removing sites like Arrabona, Gorsium-Herculia, Ad Mures, Mursella, Solva and Scarbantia, it is possible to view a correct situation of the monetary index for counterfeit pieces.

Looking at the situation, a continuous activity is present from Augustus (27 BC – AD 14) to Commodus (180-192), with two small peaks during Trajan (98-117) and Antonius Pius (138-161).

With the start of the Severan period, coefficients go up in value at about 20 times higher than the previous period. During the Severan dynasty very high values are recorded on the sites, at the beginning of the Military Anarchy a drop in intensity takes place on two of the sites, the index from Brigetio being the only one to rise again in intensity under Gordian III (238-244).

After the situation on the province was determined, a new graph which gives a comparative analysis of the two provinces (Fig. 53), when it comes to genuine coins' index, was established.

It is easy to see many resemblances between the two regions, for example during the Flavian period both provinces record a growth in intensity followed by a decrease in the time of Domitianus (81-96) and a constant rhythm for the Antonine period. The only site with higher values for this period is Arrabona which has the majority of its pieces dated for this time period.

For the Severan period, sites from both provinces show increases in their coefficients, the only site which will record a decrease is Arrabona where the coin index goes down until it disappears under Severus Alexander (222-235).

The two main increments in intensity take place under Septimius Severus (193-211) and Elagabalus (218-222) for the majority of sites. Next follows a decrease for the coefficients under Severus Alexander (222-235), the values of the indexes go down even more during Maximinus Thrax (235-238).

With the beginning of the Military Anarchy period, a difference between the two provinces is seen. The coefficients for sites located in Dacia get a little higher in value, resembling the Antonine period, while sites located in Pannonia have their coin index enter a new period of growth, similar in intensity with that from the Severan dynasty or even higher.

Interesting facts appear when looking to (Fig. 54), a graph representing all indexes for counterfeited pieces from the two provinces. First of all, in the case of sites located in Pannonia the index starts from Augustus (27 BC – AD 14) while for those located in Dacia only from Vespasian (69-79). Secondly, the value of the coefficients from Dacia are much higher than those from Pannonia during the Antonine period.

This fact is also supported by the monetary reform from made during Domitian (81-96)[107], when the silver content of denarii is reduced from 950‰ to approximately 900‰[108]. Therefore, old coins were melted, coins that were issued before the reign of Vespasian (69-79) could not be used as models for counterfeit pieces in Dacia because they were out of the local circulation by the time the counterfeiters worked.

Still, there is some resemblance between the provinces, during the Severan period both show a growth in intensity from Septimius Severus (193-211), many of the sites reach their highest values from the graph during the Severan dynasty. Therefore, during Septimius Severus (193-211) some sites like Samum, Ulpia Traiana Sarmizegetusa, Arcobadara, Buciumi and Porolissum reach their highest values, during Caracalla (211-217) the sites from Brigetio and Potaissa reaches it, for Elagabalus (218-222) sites like Carnuntum and Apulum while at the end of the dynasty under Severus Alexander (222-235) the site of Intercisa.

Under Maximinus Thrax (235-238), a general decrease is recorded for the coefficients followed by an increase during emperors Gordian III (238-244) and Philip I (244-249).

Finally, all of the results were compiled in other to form a new graph (Fig. 55) which presents the index of genuine coins and counterfeited ones from both provinces, in order to compare the overall results.

First thing that stands out from the graph is the increase of the coefficients for genuine pieces between the years 69 – 81, while the index for counterfeited coins has a smaller value for this time. Next follows a slight decrease in

[105] Harl 1996, 14.
[106] Jones 1992, 76.
[107] Harl 1996, 14.
[108] Jones 1992, 76.

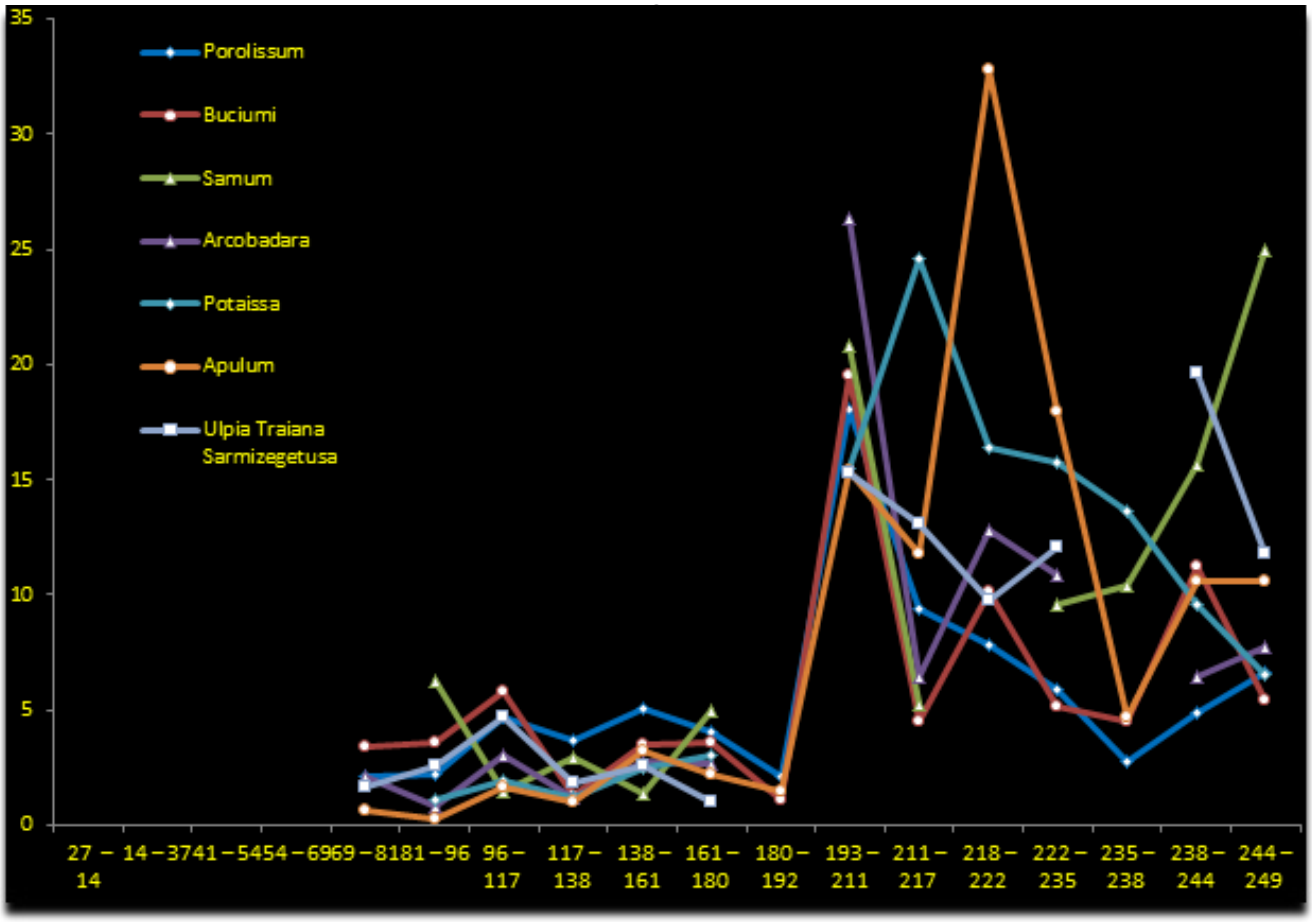


Fig. 51 – Graph with index of counterfeited coins on sites from Dacia;

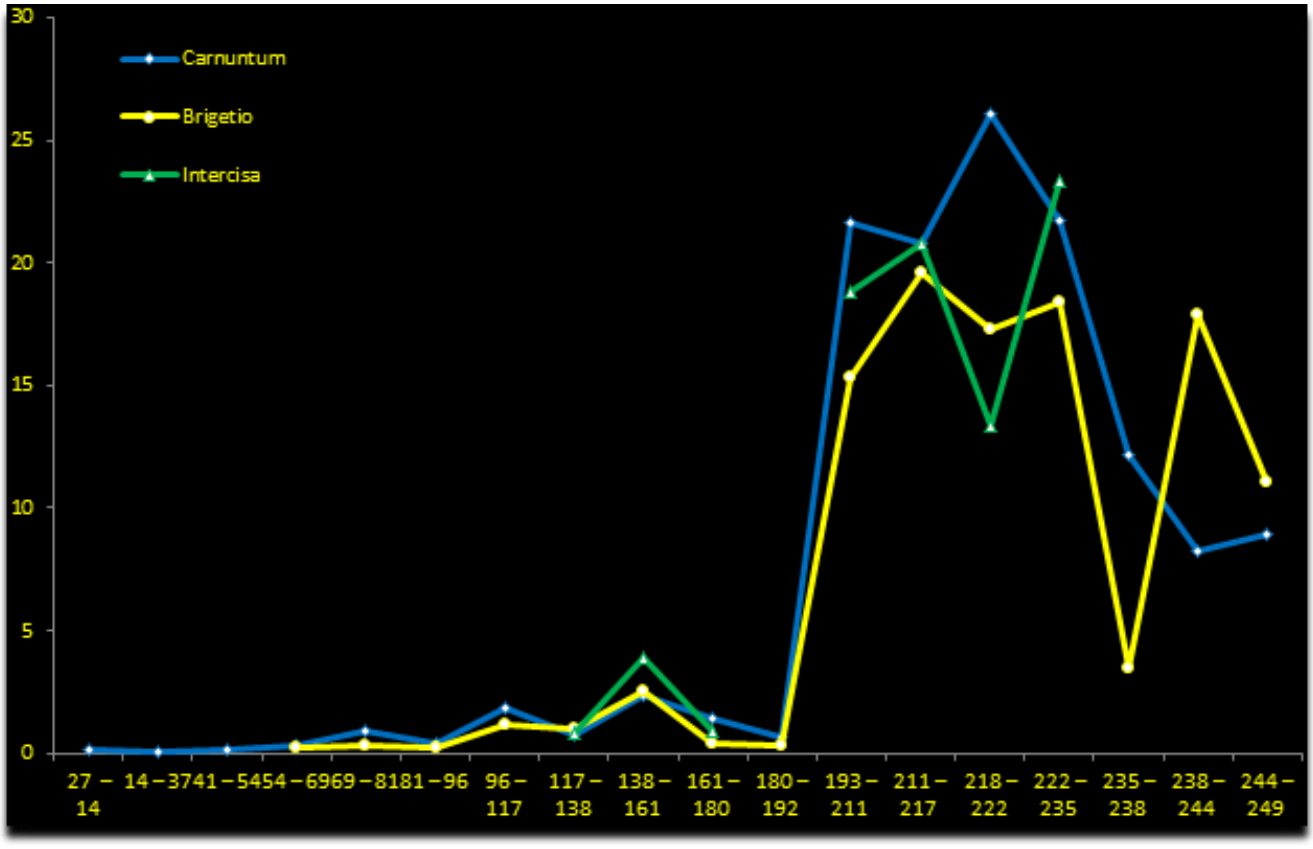


Fig. 52 – Graph with index of counterfeited coins on sites from Pannonia;

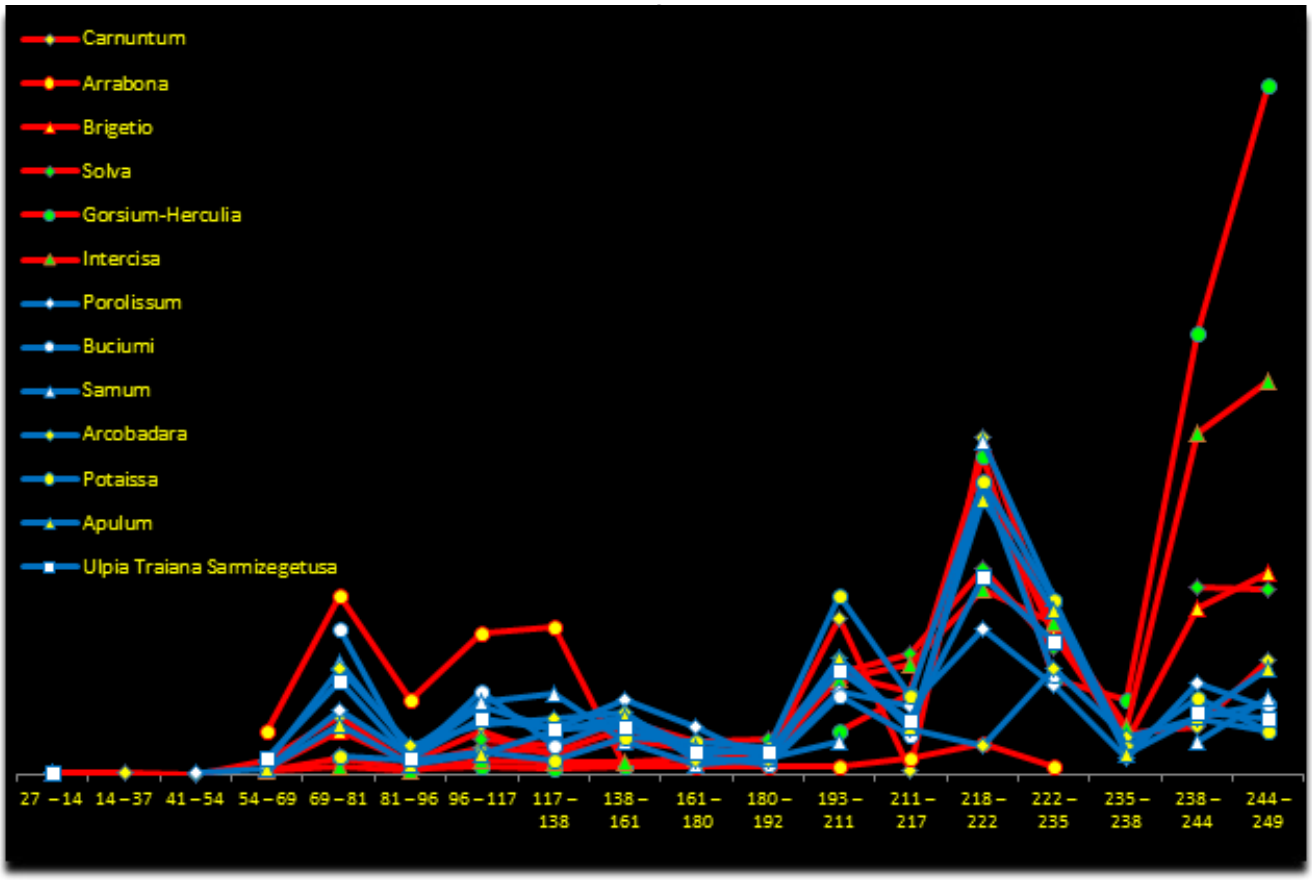


Fig. 53 – Graph with index of genuine silver coins on sites from Dacia and Pannonia;

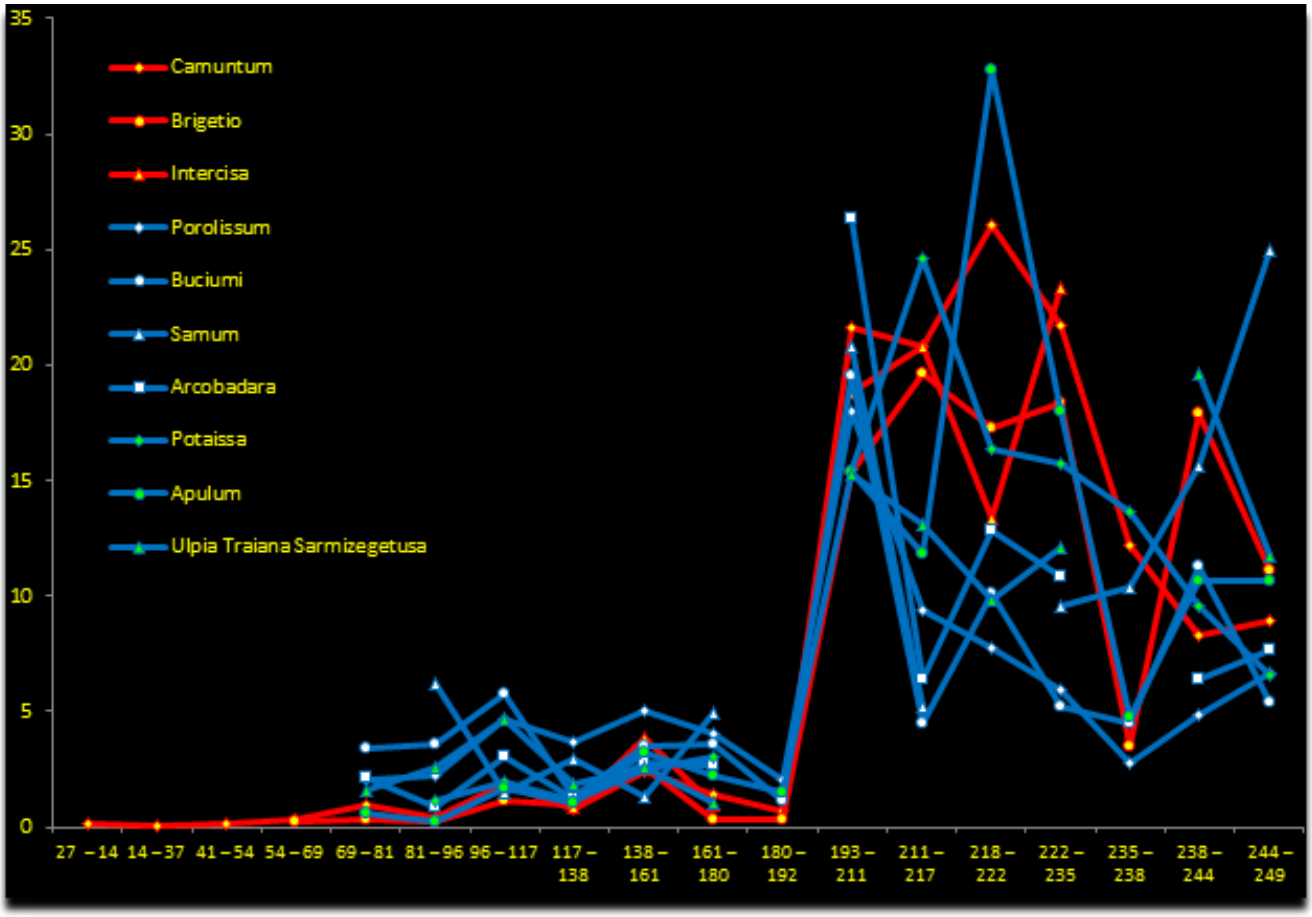


Fig. 54 – Graph with index of counterfeited silver coins on sites from Dacia and Pannonia;

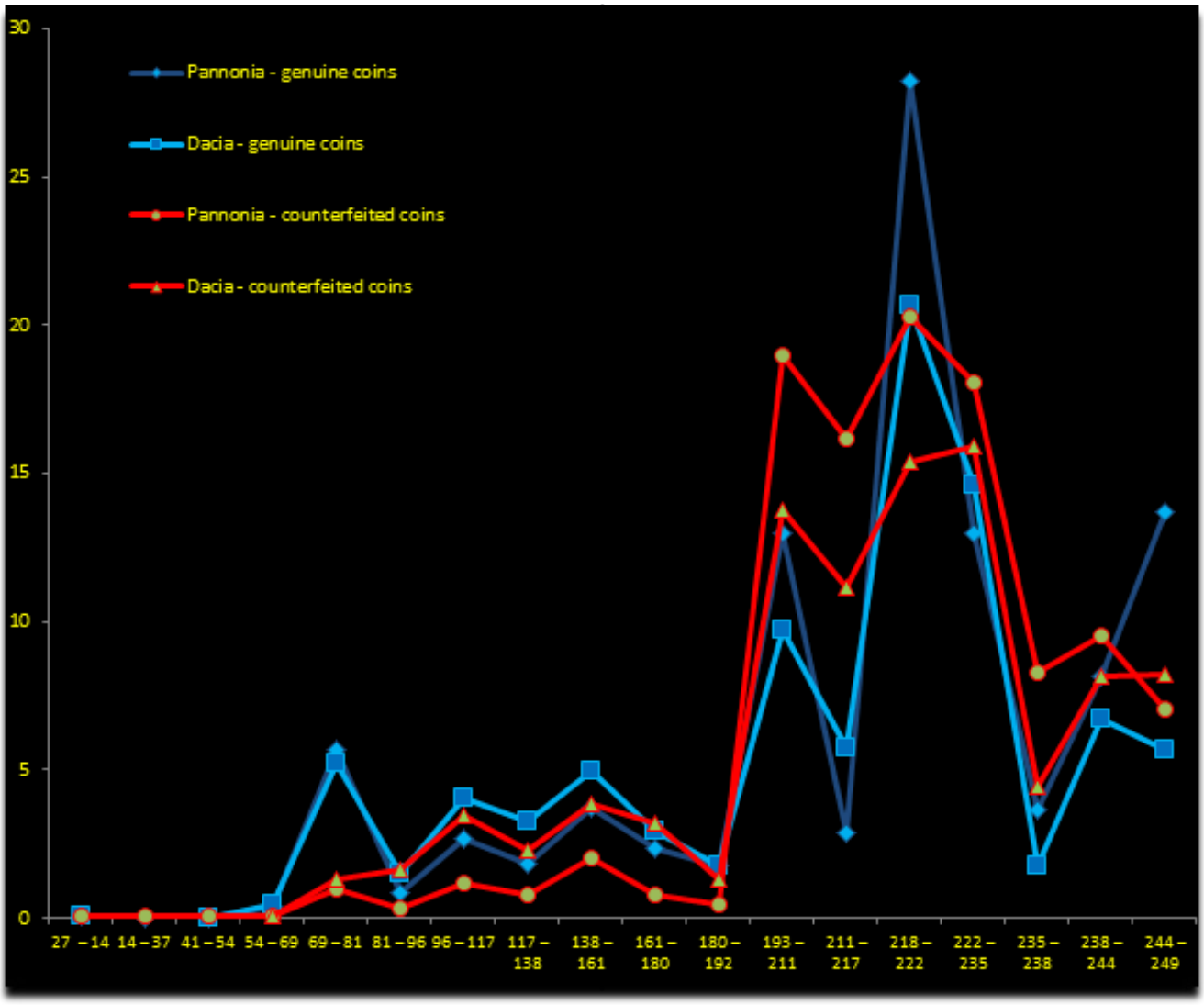


Fig. 55 – Graph with index of genuine and counterfeited silver coins from Dacia and Pannonia;

intensity for genuine pieces under Domitian (81-96), later all indexes increase in value and maintain a steady rhythm during the Antonine period. We can see that the coefficients for the province of Dacia are slightly larger in value than those from Pannonia for the time period of 96 – 192.

After the year 192 when the reign of Septimius Severus (193-211) starts, all of the coefficients report a high increase that maintains during this dynasty with slight variations. For Septimius Severus (193-211) the index for counterfeited pieces is higher than that for genuine ones, the situation maintained even for Caracalla (211-217).

From the period of Elagabalus (218-222) the index for genuine pieces will overpass the one for counterfeited ones but the new situation does not last long, under Severus Alexander (222-235) the coefficients for genuine coins is decreasing in intensity, being smaller than the one for counterfeited pieces.

With Maximinus Thrax (235-238) all indexes go down in intensity, those for genuine coins still being lower in value than counterfeited ones. From Gordian III (238-244) coefficients start to go up in value again following that under Philip I (244-249), index for genuine pieces from Dacia to go down in value, index for counterfeit coins from Dacia to maintain at a close value with that for counterfeited coins from Pannonia and the coefficient for genuine pieces from Pannonia to rise and overtake all the others in size.

For the most part of the graph, both types of index maintain a parallel course with each other, the variations produced in time not affecting this rhythm.

COUNTERFEITED COINS

First of all, for a better understanding of counterfeited pieces it is important to mention that all plated, casted and plated hybrids have been taken into consideration when establishing the correct values for index of counterfeited coins, all of these pieces not being recognize by the official issuer.

In the case of counterfeited coins, the oldest known coin mould for casting Roman pieces was found in 1555 at Lyon[109], until today over 7.000 fragmented or entirely pieces[110] belonging to Roman coin moulds have been identified[111] of which approximately ¾ were used for casting Roman silver pieces[112].

Very few Roman hordes, that have been identified until now, contain in their composition cast pieces but new

[109] SCHWARTZ 1963, 13.
[110] AUBIN 2003, 157-162.
[111] GĂZDAC/OARGĂ/ALFÖLDY-GĂZDAC 2015, 8.
[112] AUBIN 2003, 157-162.

archaeological research have brought to light hordes dating to Roman times and made entirely of cast coins, such as one from Mogontiacum in Germania Superior (Mainz, Germany) which contains 63 cast denarii[113] and horde number VI from Apulum (Alba Iulia, Romania) which has 232 cast denarii of bronze core[114].

On the archaeological site of Potaissa have been found cast denarii, and after a detailed analysis it was possible to determine the alloy out of which they were cast, an alloy made up from coper-stannic-zinc also known as "white bronze" that in antiquity could have been considered as a denarius of poor quality[115].

Plated coins have always been of interest for numismatists even from the 19th century[116], such that until today we have a vast collection of works and many points of view on the subject[117].

The first plated pieces appeared shortly after the introduction of coins in antiquity[118], this technique being widely used in ancient Greece[119] and during the Roman Republic[120].It remained in use until the end of the 3rd century AD[121] when the quality of the silver coin reached such a low value that it was removed from circulation[122].

Because this technique was used for such a long period of time, by the official authorities that issued this type of coins, in legal terms – counterfeited pieces[123], or by clandestine workshops which were always under the pressure of the Roman law[124], it proved to be a very effective technique in trying to save more silver[125]. The idea of fraud committed by the state[126] is very common between numismatists being supported by the very low price of copper compared with the price of silver, in Rome during the Republican period the exchange rate between the two metals was approximately 1 to 240[127].

The phenomenon of plated silver pieces didn't represent a typical model for Danubian regions, being reported all along the Roman Empire, with recorded discoveries of minting patterns in many parts of the empire. This kind of moulds have been found in Augusta Raurica, Saint-Mard[128].Actually, these discoveries can suggest the existence of clandestine workshops spread all over the empire, the high amount of coin moulds show the presence of counterfeiting coin activities untroubled by state authorities[129], the severe Roman laws against counterfeited pieces being completely ignored[130].

[113] GĂZDAC/OARGĂ/ALFÖLDY-GĂZDAC 2015 2015, 9.
[114] GĂZDAC/OARGĂ/ALFÖLDY-GĂZDAC 2015 2015, 9.
[115] PÎSLARU 2009, 66.
[116] BERNAREGGI 1965, 6-7.
[117] PÎSLARU 2009, 51.
[118] LAWRENCE 1940-1941, 190.
[119] BERNAREGGI 1965, 8-9.
[120] BERNAREGGI 1965, 21.
[121] CHIRILĂ 1991, 170. GĂZDAC/ALFÖLDY-GĂZDAC 2001, 142.
[122] BERNAREGGI 1985, 88-89.
[123] CURRY 1973, 231.
[124] GĂZDAC/ALFÖLDY-GĂZDAC 2001, 138-139.
[125] PÎSLARU 2009, 54.
[126] LAWRENCE 1940-1941, 194. BERNAREGGI 1965, 5-31. SERAFIN 1968, 9-30. MORELLI 1990, 115.
[127] BERNAREGGI 1965, 29-30.
[128] GĂZDAC 2002, 178.
[129] ALFÖLDI 1971, 358-363. KING 1996, 245-246.
[130] GRIERSON 1956, 244-261.

Plated antoninianus, is found in scarce quantities, part because the antoninianus was from the start an overly evaluated coin[131] and because it suffered a quick depreciation in value. It was not worth faking them.

Still, counterfeited coins have been recorded in high numbers, the proportions differing from one site to another. Thus, besides the 8.700 genuine pieces, 2.400 plated pieces have been identified on different sites as follows next.

At Porolissum there have been recorded 476 plated coins with a proportion of 40%, for Potaissa 90 counterfeited pieces have been identified representing 10% out of the total amount of coin, on the site from Apulum there have been found 269 plated pieces with 43%, for Ulpia Traiana Sarmizegetusa 51 coins are known to be plated which represent 18%, at Arcobadara there have been found 77 plated pieces with 28%, Buciumi has 74 plated coins representing 44%, on the site of Samum there have been identified 29 plated pieces with a proportion of 33%, for Intercisa there have been recorded 56 plated coins with 13%, at Gorsium-Herculia only four plated pieces have been found with 1%, on the site from Mursella just two coins which are plated have been identified representing 7% of the total amount of pieces, at Arrabona are known two plated coins with 1%, for Ad Mures just six plated pieces have been identified 6 representing 24%, in the case of Solva 12 plated coins representing 10% have been identified, at Brigetio there are known 289 plated pieces with a proportion of 22%, while for Carnuntum 780 counterfeited pieces have been recorded which represent 15%.

It is important to mention, as it is easy to observe in the graphs as well, sites from Pannonia, with the exception of Carnuntum and Brigetio, show a deficit when it comes to identified counterfeited pieces.

The source of this problem is most likely based on the older research which was made on these pieces, the limited knowledge and experience of the time having its toll on the amount of identified counterfeited coins. How else can we explain that on studied locations from Dacia and the site from Carnuntum, where the numismatic evidence was revised over time, the amount and proportion of counterfeited pieces is much higher than those from other locations in Pannonia, many times between 20% and 40% of the total amount of discovered coins being identified as counterfeited pieces.

One image that is always present on the graphs for most locations is the large amount of counterfeit pieces dated during the Severan period.

HYBRID COINS

Hybrid coins are pieces that display on their obverse and reverse prototypes originating from two different issues[132].

In the case of hybrid pieces, we must distinguish two separated categories for this type of coin. First there are the "genuine" hybrids, pieces that were made by striking the image on their surface. In the current state of research these types of coin are not found in special numismatic catalogues (e.g. RRC, RIC, MIR), but because the used metal (most

[131] GĂZDAC 2002, 179.
[132] AMANDRY 2001, 281.

commonly silver) fits as quality, size and weight in official standards. It is possible that in the near future, because of the identification of more and more types of "hybrids", to move this kind of pieces to the ranks of official coin types.

Secondly there are the plated hybrid coins resulted after the process of plating silver on top of bronze core pieces while using a combination of prototypes, on both obverse and reverse, unknown in Coin catalogues.

The main difference between the two categories is that the first one shows marks of striking, thus minted by authorised workshop while the second type presence traces of plating, placing these pieces in the counterfeited section.

Hybrid coins have been identified in the same archaeological contexts as genuine pieces, therefore we should not consider them as avoided pieces but coins which were used in daily economical actions.

In the case of the studied sites, hybrid pieces have been identified on more than one location. Four hybrid pieces have been discovered at Ulpia Traiana Sarmizegetusa (Fig. 1). One coin for Antonius Pius (138-161), one under Septimius Severus (193-211), one dated at Caracalla (211-217) and a piece dated at Severus Alexander (222-235).

For Potaissa (Fig. 7) 23 hybrid coins have been identified, one dated at Trajan (98-117), two pieces dated under Marcus Aurelius (161-180), six during Septimius Severus (193-211), two other under Caracalla (211-217), one for Elagabalus (218-222), eight dated at Severus Alexander (222-235), one piece for Gordian III (238-244) and two coins during Philip I (244-249).

The site from Arcobadara (Fig. 10) offers just one hybrid piece dated at Septimius Severus (193-211).

At Porolissum (Fig. 19) have been identified six hybrid coins, one dated at Marcus Aurelius (161-180), one under Septimius Severus (193-211), one during Caracalla (211-217), two coins identified for Severus Alexander (222-235) and a piece for Gordian III (238-244).

Gorsium-Herculia (Fig. 25) is a site where there have been located ten hybrid coins dated for: Caracalla (218-222) two pieces, Severus Alexander (222-235) one coin, Gordian III (238-244) four pieces and Philip I (244-249) three coins.

Further on, at Brigetio (Fig. 31) there has been identified just one genuine silver hybrid coin for Septimius Severus (193-211).

Arrabona (Fig. 34) as well offers just one identified hybrid coin with the image of Nerva (96-98).

On a more extended archaeological site such as the one from Carnuntum (Fig. 46), the quantity of discovered hybrid coins is significantly larger, 52 pieces more exactly. Thus the coins have been dated for: Domitian (81-96) two pieces, Trajan (98-117) two coins, during Antonius Pius (138-161) two pieces, 15 coins under Septimius Severus (193-211), six for Caracalla (211-217), Elagabalus (218-222) three coins, Severus Alexander (222-235) three pieces, one in the time of Gordian III (238-244) and 18 pieces for Philip I (244-249).

As we can observe in the graphs from sites where hybrid coins have been discovered, this type of coin represent from 1% to 3% from the total number of pieces, on the sites where they have been discovered.

In the case of plated hybrids, the situation is a little different as we can see when revisiting the graphs for the sites.

On the site from Apulum (Fig. 4) there have been identified 13 plated hybrid pieces, two dated during Antonius Pius (138-161), three coins with the image of Marcus Aurelius (161-180), one piece dated during Septimius Severus (193-211), one coin for Caracalla (211-217), two coins dated under Severus Alexander (222-235), two pieces for Gordian III (238-244) and two identified for Philip I (244-249).

At Potaissa (Fig. 7) 20 silver plated hybrids have been discovered, seven dated for Septimius Severus (193-211), six during Caracalla (211-217), four pieces dated under Severus Alexander (222-235), one coin in the time of Maximinus Thrax (235-238) and two pieces for Gordian III (238-244).

The site from Arcobadara represented in (Fig. 10) shows only one discovered silver plated hybrid dated for the period of Marcus Aurelius (161-180).

The existence of three plated hybrids has been recorded at Samum (Fig. 13). One of the was dated during Domitian (81-96), one for Gordian III (238-244) and the final one identified for the time of Philip I (244-249).

Porolissum (Fig. 19) is the site where there have been located five plated hybrids, one was dated during Vespasian (69-79), one for Marcus Aurelius (138-161), two from Septimius Severus (193-211) and one at the time of Severus Alexander (222-235).

From the graph made for Carnuntum (Fig. 46) we can observe the presence of 206 plated hybrids. One of the pieces has been dated during Augustus (27 BC – AD 14), another piece for Claudius (41-54), one coin dated during Vespasian (69-79), two pieces dated under Nerva (96 – 98), nine coins dated during Trajan (98-117), one piece for Hadrian (117-138), 14 coins for the time of Antonius Pius (138-161), nine during Marcus Aurelius (161-180), one dated at Commodus (180-192), 29 coins dated during Septimius Severus (193-211), 50 pieces identified at Caracalla (211-217), 13 dated under Elagabalus (218-222), 52 coins dated in the time of Severus Alexander (222-235), six from Maximinus Thrax (235-238), four pieces dated at Gordian III (238-244) and 13 coins dated at Philip I (244-249).

From the proportional point of view, plated hybrid coins sum up between 1% and 4% of the total amount of silver coins discovered on sites, but because of their plated status they do nothing more than adding to the number of counterfeit pieces. Even if they used as model, for counterfeiting coins, a piece which was unique from the numismatic point of view, the resulted plated hybrid coins are not more special than other counterfeited pieces.

Taken all together, recorded hybrid coins and plated hybrid pieces, we obtain a new graph (Fig. 56) which represents the distribution of these pieces from a quantitative and chronological point of view.

The first thing that we see is the large number of hybrid coins from the time of Septimius Severus (193-211), Caracalla (211-217), Severus Alexander (222-235) and Philip I (244-249).

On the other side even these periods with very high values of "official" hybrids, does not compare with the higher quantity of plated hybrids. Thus, plated hybrid pieces, record higher values for the period of the Antonine emperors like

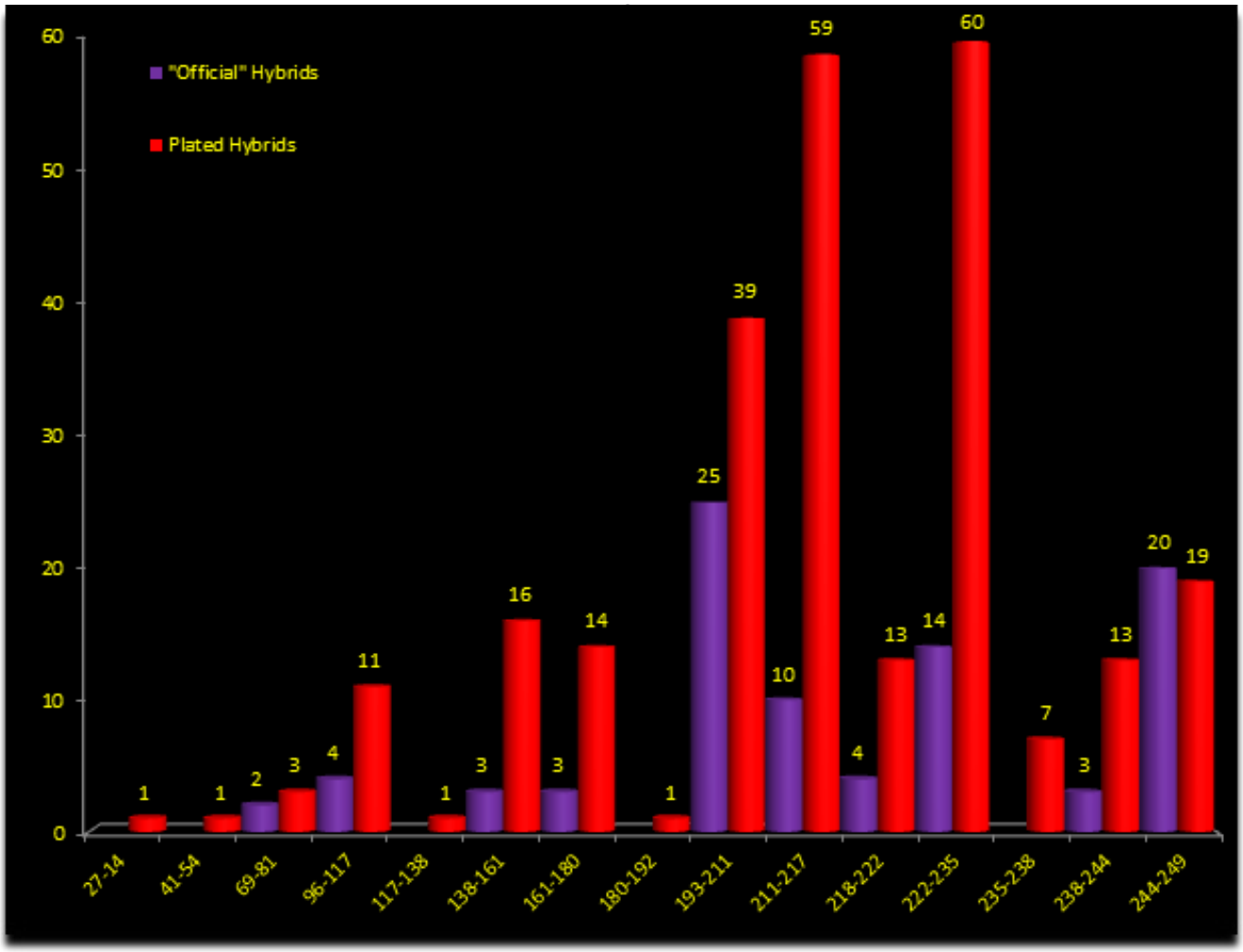


Fig. 56 – Graph with hybrid coins from all studied sites, on issuers;

Trajan (98-117), Antonius Pius (138-161), Marcus Aurelius (161-180), for emperors from the Severan times as Septimius Severus (193-211), Caracalla (211-217), Elagabalus (218-222), Severus Alexander (222-235) and for the beginning of the Military Anarchy during Maximinus Thrax (235-238), Gordian III (238-244) and Philip I (244-249).

It is very interesting that there have been discovered more plated hybrids than hybrid coins and that some of these plated hybrids were dated for periods of time when there were no economic problems in the Roman Empire. The main problem is that plated pieces offer just one possible dating, only after the issuing of the coin which was used as model for the counterfeited one.

Until now on this sites there have been accounted 88 hybrid coins and 258 plated hybrid pieces, which seams a lot at first glance, but if we take into consideration that the total amount of studied coins for this paper is close to 8.700, even these results are very modest. Although, as few as they are, these types of coins signal their presence through unconventionality and by not respecting the numismatic pattern.

CONCLUSIONS

After the interpretation of all available data, some major conclusions about counterfeit pieces and hybrid coins may be drawn.

It is correct to say that despite a sever legislation against coin counterfeiting actions, these types of pieces have been identified in large numbers on archaeological sites from both the Roman provinces of Dacia and Pannonia.

On most sites located in Roman Dacia, counterfeited coins have been discovered in very high proportions, between 28% and 45% of the discovered silver coins dated from Augustus (27 BC – AD 14) to Philip I (244-249) are counterfeited. At Porolissum counterfeited pieces represent up to 40% of the total amount of silver coins, Apulum has a proportion of 45% of counterfeited pieces while the site from Arcobadara 28%, Buciumi has 44% and Samum with 36%. There are some settlements with lower values, such as Potaissa with 13% and Ulpia Traiana Sarmizegetusa with 18%.

In the case of Potaissa, recent studies have offered the possibility of a detailed analysis for the numismatic material coming from inside the *castrum* and civil area[133]. The coefficients for counterfeited pieces from the fortress have much higher values that index from the civil settlement[134]. Thus, the apparently different situation – because of the low percentage of counterfeit pieces on an archaeological site with a massive military activity – is based, practically, on the contribution with genuine silver coins made by the civil settlement when trying to establish the graph of monetary distribution for all Potaissa, civil settlement and military

[133] GASPAR 2014, 69.
[134] GASPAR 2014, 71.

fortress. The highest values for counterfeited pieces from the military area (28,4%) the general pattern observed on many sites from Roman Dacia, the coefficients for counterfeited pieces being higher than those for genuine coins during the Severan period[135].

Meanwhile, in Roman Pannonia, the studied sites present a similar situation with that from Roman Dacia, counterfeited pieces show in significant quantities such as Intercisa which has a proportion of 13% for counterfeited coins, Solva with 10%, Brigetio at 22% and Carnuntum with 19%.

For sites like Ad Mures, Arrabona, Scarbantia, Mursella and Gorsium-Herculia there have been identified to few counterfeited pieces, the resulted proportions may induce a bad interpretation. This apparently lack of counterfeited coins on sites located in Pannonia is more likely the result of how the discovered coins have been interpreted. The researchers from the time when these pieces were discovered, did not had all the knowledge we have today about numismatic interpretation and in some cases the historians did not had direct access to the numismatic material, only some published information about the discoveries.

Alongside the contrasting situation from Dacia, this conclusion is also supported by the resulted data coming from the archaeological site of Carnuntum, where there have been discovered over 40.000 coins in total. The rest of the studied sites from Pannonia have a suspiciously low amount of counterfeited pieces. After analysing the coin catalogues from FMRU it is very clearly that the authors of these volumes have limited themselves to the interpretation of the older published works without having direct access to numismatic material.

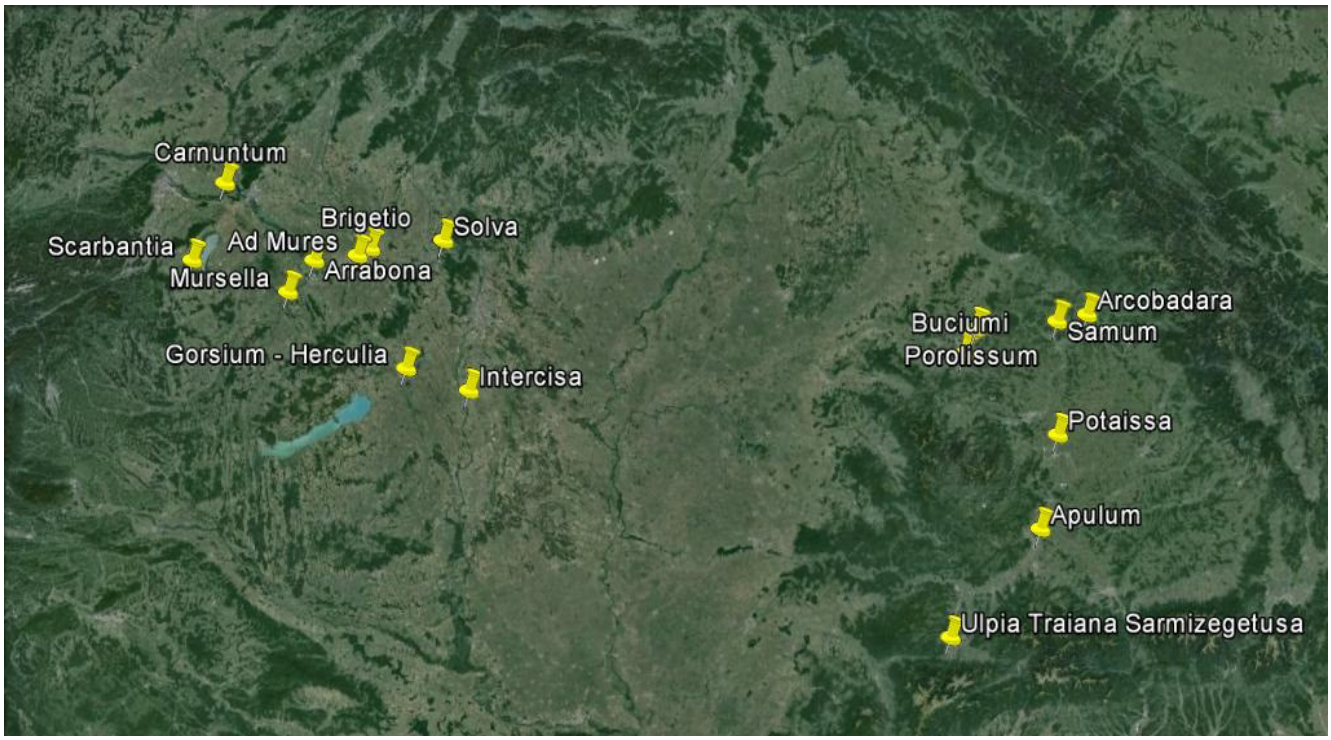
Another important aspect is deducted when analysing the graphs. These point clearly towards the Severan dynasty, characterised by many historians as a period of economic prosperity[136], as being a façade for the beginning of the monetary crises. As we have seen, on many of the sites there have been recorded high amounts of coin for this period, especially counterfeit pieces (Fig. 55).

Therefore, these graphs enable us to extract a historical-economical-financial conclusion: the heavy debasement and drop in quality of the Roman silver coin under the Severan period. The growing need of coin, in order to maintain the payment of military troops in a time when payments for units was risen by Septimius Severus (193-211) and Caracalla (211-217)[137], while the main sources of precious metal were depleting, brought in usage a new silver coin by the state, which in norms of legislation was illegal, the pleated type. Basically, the huge quantity of counterfeited piece point towards a mass production, the Roman authority becoming the "counterfeiting mastermind".

In the case of hybrid coins, these type of pieces remain an oddity of numismatics. For the studied period we can only show the lack of any pattern of distribution for these pieces, being recorded randomly and in very small amounts, between 1% and 3% for different issuers.

It is very interesting to observe if these so called anomalies of the Roman monetary system, distributed in the empire and used in everyday life, will someday be accepted as "normal" monetary types with the discovery of more "official hybrids" of the same type.

When taking into consideration the large number of coins issued by the state, this kind of errors are a normal phenomenal. Plated hybrid pieces are just counterfeited coins which fit most of the time in the chronological pattern



Map 1 – Map with studied sites;

[135] GĂZDAC 2009, 1494-1496.

[136] WILSON 2007, 292. PÎSLARU 2011, 25. PÎSLARU 2011, 81.

[137] DEVELIN 1971, 688-695. MAZZARINO 1984, 435-437. PÎSLARU 2011, 81.

of counterfeited pieces, the main problem with these coins is the same with any counterfeited piece, the only valid dating of this artefacts being the *terminus post quem* of the genuine model.

The phenomenal of counterfeit silver coins is not specific only for these two provinces of the Roman Empire, Dacia and Pannonia. Counterfeiting pieces in large quantities is a trait that covers vast parts of the empire, being even considered an epidemic phenomenal[138].

This fact can indicate a deliberate ignorance of the law by the state and an unsaid pact kept with the local authorities, during times of crises, based on the supply with quality coins made out of precious metal. This happened in close association with the army, the highest proportions of counterfeited coins being found close to auxiliary and legionary fortresses[139].

Finally, it's worth mentioning that when trying to study the monetary circulation and distribution from a region during a determined period of time, it's important to have a detailed analysis of the used pieces, preferably done with access to the numismatic material, in order to obtain the correct image of the situation.

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