

THREE CONFERENCES ON INTERNATIONAL MONETARY HISTORY

Business with Money: Monetary Politics and Capital Flows in the Era of the First Globalization

Session of the European Business History Association and Business History Society of Japan,
Paris conference on Business enterprises and the tensions between local and global, 30 Aug - 1 Sept 2012

Small change: bronze or copper coins from Antiquity to 19th c.

Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Paris, École Normale Supérieure, May 13-14, 2013

Transfers of precious metals and their consequences, 16th – 19th c.

Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Madrid, Casa de Velázquez, May 16-17, 2013

G. Depeyrot, editor

with the cooperation of C. Brégianni and M. Kovalchuk



CASA DE VELÁZQUEZ | ÉCOLE
DES HAUTES ÉTUDES
HISPANIQUES ET IBÉRIQUES

MONETA, WETTEREN 2013

THREE CONFERENCES ON INTERNATIONAL MONETARY HISTORY

Business with Money: Monetary Politics and Capital Flows in the Era of the First Globalization
Session of the European Business History Association and Business History Society of Japan,
Paris conference on *Business enterprises and the tensions between local and global*, 30 Aug - 1 Sept 2012

Small change: bronze or copper coins from Antiquity to 19th c.
Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Paris, École Normale Supérieure, May 13-14, 2013

Transfers of precious metals and their consequences, 16th – 19th c.
Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Madrid, Casa de Velázquez, May 16-17, 2013

G. Depeyrot, editor

with the cooperation of C. Brégianni and M. Kovalchuk



CASA DE VELÁZQUEZ | ÉCOLE
DES HAUTES ÉTUDES
HISPANIQUES ET IBÉRIQUES

MONETA, WETTEREN 2013

Cover: miners at Salsigne (Aude, France); galleon © Kovalenko Inna Fotolia.com;
Musée de Sète: inv. 891.14.1, Robert Mols, "Port de Cette", 1891,
Huile sur toile, 110x210 cm.

This publication was prepared in the framework of the program of the
Agence nationale de la recherche (www.anr.fr)
DAMIN (La **D**épréciation de l'**A**rgent **M**onétaire et les Relations **I**nternationales
Silver monetary depreciation and international relations) (www.anr-damin.net)
ANR 2011 BSH3 008 01.



This publication was prepared with the support of the *LabEx TransferS*
(www.transfers.ens.fr/)
(Program *Investissements d'avenir* ANR-10-IDEX-0001-02 PSL* et
ANR-10-LABX-0099).



ISBN 978-94-91384-24-0

Dépôt légal 2013/9381/05

© Moneta 2013

MONETA, Hoenderstraat 22, 9230 Wetteren, Belgium, Fax 32 (0) 93 69 59 25
www.moneta.be

Bronze and copper coins in 19th century Denmark – and found at Koldekilde on Bornholm

Michael Märcher¹

Introduction

This paper is a short survey of the development of base metal coins in the Danish monetary system with focus on the first three-quarters of the 19th century. In this period, Danish coin production was industrialized, which led to a massive increase in quality and quantity. Huge amounts of copper coins were issued from the last years of the Napoleonic Wars, and huge amounts of bronze coins were issued from the second half of the 1850s when bronze coinage replaced copper coinage – after difficulties with the production of coins in the new and better material.

These developments were part of the Danish monetary policy in the 19th century, which should create a new, stable, common, homogeneous, and unifying monetary system in the entire realm (the kingdom of Denmark and the duchies Schleswig and Holstein).

The survey is based on studies² of Danish coin production in the 19th century, which are compared with the coin finds from the location Koldekilde³ on the Danish isle Bornholm in the Baltic Sea.

Koldekilde

Almost 500 small coins⁴ from the 17-20th century have been found at Koldekilde (Cold Spring) through dredging of the spring in 1894-1895 and with metal detector c. 1980 in the area around it. Koldekilde is located in the middle of the isle Bornholm in the forest Almindingen, and around it the Island's annual Midsummer Day market took place until the late 19th century – and coins were thrown into/offered to the sacred spring. The offered coins were repeatedly collected for a church and a hospital on Bornholm until the very beginning of the 19th century. The original number of coins offered in the spring must have been much larger – and some of them probably also older – than the preserved coins, but this problem has little relevance for the present discourse. In the 19-20th centuries the area around the spring was used for cattle shows, shooting meetings, and other activities. The coins found stem from these different contexts: deliberate spring offerings and accidental losses at markets, cattle shows, and other types of public gatherings.

¹ The National Museum of Denmark, The Royal Collection of Coins and Medals, Frederiksholms Kanal 12, DK-1220 Copenhagen K, michael.maercher@natmus.dk. This paper is written as part of two projects, 1) a project about metal detector finds from Vester Herred (Shire) on Bornholm financed by the Danish Agency for Culture (Rådighedssummen 2013) led by curator and senior researcher Helle W. Horsnæs, and 2) my two-year post.doc.-project about 12-19th century coins finds from Bornholm financed by The Carlsberg Foundation.

² Michael Märcher: *De kongelige møntsteder i Altona og København 1813-1873*, Odense 2012; Michael Märcher: Coins, metals, and reforms: A survey of Danish monetary history 1813-1873, in Georges Depeyrot (ed.): *Moneys and Economies during 19th Century (from Europe to Asia)*, Collection Moneta vol. 139, Wetteren 2012, 77-95.

³ The information about the coin finds from Koldekilde stems from the protocols of coin finds at The National Museum of Denmark, The Royal Collection of Coins and Medals, nos 840, 3711, 3712, and 3774.

⁴ Standard coins are coins produced according to the monetary standard in use, while small coins are coins produced below standard, with insufficient intrinsic value, and normally only for domestic use.

Here all the coins dating from before 1920 (331 coins) are put together without any contextual division and used as a case to show the development of base metals in Danish coinage. The oldest coin found at Koldekilde is a Danish 1 skilling of silver from 1614, while the most recent is a Danish 25 øre of cupro-nickel from 1968. 164 Danish coins from 1920-1968 have been found at Koldekilde.

330 coins of the 331 coins from 1614-1919 are small coins. The last coin is a $\frac{1}{12}$ thaler from 1787-1801 produced in Altona. It is not a big silver coin, but since it was produced according to the Danish pre1813 thaler standard, it should be considered a standard coin. Only 30 coins are foreign, 27 Swedish coins from 1845-1912 and three Norwegian coins from 1877-1902. These foreign coins are explained by the proximity to Sweden, the common coin circulation which existed between Denmark, Norway, and Sweden due to the Scandinavian Monetary Union in the 1870s-1910s, and by the important Swedish emigration to Bornholm c. 1880-1920. Many Swedes worked in Bornholm's quarries. Before 1814, Denmark and Norway were ruled by the same king and had common coin circulation, so Norwegian coins from before 1814 are not considered foreign. It is therefore not surprising that a significant part (c. 26-28%) of the 46 coins from the 17-18th century found at Koldekilde were produced in Norway after the discovery of the important silver mines in Kongsberg 1623. 73 of the 331 coins are of silver and 258 are of base metals. Their over-all chronological distribution is shown in Diagram 1, and this distribution generally corresponds very well with the development in the production of base metal coins/the mint outputs.

Danish copper coins before 1813

Until the 1770s only relatively small amounts of official copper small coins were produced in the realm during the 17-18th centuries. These were not high priority coinage, and the amounts were far from sufficient to become important; the small coins then in use were silver coins. None of the domestic copper coins from before 1770s are found at Koldekilde, nor are any foreign copper coins from those centuries. The Danish-Norwegian-Schleswig-Holstein development is in contrast to the Swedish one. Sweden had very rich copper mines and produced and used massive amounts of copper coins, e.g. the peculiar Swedish plate money of copper, which were not small coins – not in any way! In the Danish realm plate money was never produced; only an unsuccessful trial piece from 1714 exists (fig. 1).⁵

Huge amounts of copper coins were produced in the realm in the 1770-1780s as part of the monetary policy that tried to improve the difficult monetary system of the time and to produce and distribute enough of the smallest small coins to meet some of the never-ending and in those years definitely increasing demands. Almost 55 million pieces of 1 skilling with the year 1771 were produced in Altona, Copenhagen, and Kongsberg (Norway) in the period 1771-1786 – and also c. 2.75 million pieces of $\frac{1}{2}$ skilling (fig. 2). These coins became widespread due to massive demands, high production numbers, and a well-functioning distribution from three different mints. They had an attractive size, c. 11.69 and c. 5.85 grams, and were quite handy. The coins' size became a weakness, because rising copper prices, especially during the Napoleonic Wars, made their intrinsic value higher than their nominal value.

Use of the copper 1 skilling from the 1771-86 was very widespread until the first decades of the 19th century – and it was a key copper coinage for the realm. The two earliest copper coins from the 17-18th centuries found at Koldekilde are 1 skilling pieces from this period. The inflation and the monetary reforms of the 19th century ended the circulation and importance of the $\frac{1}{2}$ and 1 skilling from 1771-1786. They were important, but not as important as the copper coins from 1812-1819, which included much higher denominations and at the same time were almost the only small coins produced, while massive amounts of especially 2 skilling in silver were made in the 1770-1780s.

⁵ Michael Märcher, unpublished research.

In 1812 more than 300,000 pieces of 1 skilling from 1771-1786 were re-struck to 12 skilling without any melting, casting etc. at the mint in Copenhagen (fig. 3). This clearly shows the inflation in the realm during the wars, which led to the great monetary reform (the state bankruptcy) of 1813. This 12 skilling and the 3 skilling 1812 were the first Danish copper coins with a significant nominal value; times, solutions, and means of payment were changing during the last financially and monetarily very fatal years of the wars. None of the more than 300,000 pieces of 12 skilling 1812 are found at Koldekilde, but three pieces of the 3 skilling 1812 are found. These two coin types and an also mass-produced 2 skilling from 1809-1810 were the first high-quality industrialised copper coins in Denmark. The newly erected steam-run mint in Copenhagen produced more than 4 million pieces of 3 skilling 1812, which were very quickly put into circulation and spread all over the country incl. Bornholm. The 2 skilling 1809-1810 was produced in even greater numbers, but are not found at Koldekilde; perhaps the difficult connections between Bornholm and the rest of the realm during the wars hindered its distribution and circulation on Bornholm?⁶

Base metal coinage 1813-1820s

The Danish state bankruptcy – a major monetary reform of 5th January 1813 – put a lot of pressure on the two Danish mints located in the realm's two largest cities, Altona near Hamburg and the capital Copenhagen (table 1-4). Lots of new copper and silver coins had to be produced: The monetary circulation in the kingdom of Denmark around 1813 was chaotic and consisted of different types of inconvertible notes, small denomination notes, and low-quality small coins. Nothing was stable or well-organized. A general lack of all types of coins existed, especially in Jutland, where some foreign coins also circulated.⁷

The monetary reform meant that a large part of the circulating coins and notes had to be withdrawn and replaced. In other words, the realm's monetary circulation should be substituted. To make this major change possible, the reform established a new set of temporary circulation values on the older copper coins. They and the small coins of silver would be withdrawn when enough new small coins were produced. The production of new coins was urgent. The first coinage after the reform was 1 skilling 1813 in copper (fig. 4). The mints were quickly given orders to produce large amounts, and the first new copper 1 skilling were ready around the beginning of March 1813. The motifs on the coins of all three mints should be identical, so die materiel – matrices and poinçons – were sent from the mint in Copenhagen to the mints in Altona and Kongsberg. The kingdom of Norway and therefore the Kongsberg mint were separated from Denmark in 1814 as a result of The Congress of Vienna, and Norway is therefore not included in this paper.

Since the 1 skilling 1813 was a new coin type, the bottleneck in production was in the beginning the lack of dies. Not least because rolled copper strips were ready. They were not manufactured at the two mints, but quickly delivered from the copper works in Frederiksværk in Zealand and in Hoherdamm in Holstein. The Danish mints generally did not melt or cast much base metal in the 18-20th centuries except from the second half of the 1850s to c. 1872 and generally from around 1920 to 1970s/1990s. Both mints worked around the clock in 1813, and they together produced more than 6 million pieces of 1 skilling 1813, but in May-July production ceased due to lack of copper, which especially during the end of The Napoleonic Wars became more and more expensive and difficult to acquire. Many mints' production, e.g. in Günzburg in Germany and in Salzburg in Austria, was hampered by lack of copper.

The production of 1 skilling 1813 for the Danish Ministry of Finance (Finanskollegiet) was never resumed. The reform created a new state-owned bank, The Bank of the Realm

⁶ No finds of 2 skilling 1809-1810 are recorded for Bornholm at The Royal Collection of Coins and Medals or at The Museum of Bornholm.

⁷ About the reform and Danish gold and silver coinage etc. of the 19th century see the references in note 2.

(Rigsbanken).⁸ The bank had many different monetary tasks, among others to manage coin production for the kingdom of Denmark. Almost all coin production 1813-1818 was for this bank and took place in Copenhagen. It had obtained the right to issue so-called rigsbanktegn (tokens of The Bank of the Realm) in six different denominations 2, 3, 4, 6, 12, and 16 skilling (fig. 5). In practise, they were small coins of copper produced for circulation in the kingdom, and they should be understood as temporary, much needed small coins – of vital importance!

Lack of copper was the main problem for the production of the rigsbanktegn. The new bank took over the holdings of the ministry and managed to get new deliveries from the two copper works, which made the first productions possible. The mints in Altona and Copenhagen were quite successful, and in the autumn of 1814 sufficient amounts were produced to start the withdrawal of the pre-reform small coins of copper. These coins could be re-coined into rigsbanktegn. The division of labour was as follows: the mints received the withdrawn coins from different public offices and sent them to the two copper works for melting, casting, and rolling into copper strips, which were then returned to the mints.

The worst part of the postwar-crisis seemed to be over around 1816; therefore the plan to create a privately-owned *central* bank was initiated, and the National Bank was founded in 1818 as a joint-stock company. It took over the Rigsbank and was given a royal charter for 90 years, which included a monopoly on note-issuing and other obligations in relation to the monetary circulation. In general, the monetary policy vis-a-vis the notes' rise to par as well as trade, shipping etc. seemed to be going very well in 1817-1818, but the amount of small coins (as well as of all other coins) in circulation was still not completely sufficient around 1818. During 1818-1819 the mint in Copenhagen produced almost 2.7 million pieces of 1 and 2 skilling in copper (fig. 6) from strips delivered by the works in Hoherdamm.

Diagram 1 clearly shows that the decade 1810-1819 was a turning-point for the development and use of base metal coins in Denmark. The 69 copper coins from this decade found at Koldekilde are 21 % of the coins from 1614-1919 and consist of 30 pieces of 1 skilling 1813, seven pieces of 1 skilling 1818, 17 pieces of 2 skilling 1815, three pieces of 2 skilling 1818, the aforementioned three pieces of 3 skilling 1812, one piece of 3 skilling 1815, four pieces of 4 skilling 1815, two pieces of 6 skilling 1813, one piece of 12 skilling 1813, and one piece of 16 skilling 1814. The coins from Koldekilde are mainly the smallest denominations, but some larger ones found their way to the area, demonstrating the wide use and importance of all the different types.

The copper coins from 1812-1819 dominated Danish coin circulation at least until the 1830s. They were of high-quality – technically almost like modern coins – very numerous, wide-spread, had high and low denominations, and were in demand in a society practically without (production of) silver coins. This necessary and highly important large-scale/industrial production of well-produced base metal coins was only possible due to the very early industrialisation of the two mints in Altona and Copenhagen, which started during the Napoleonic Wars and fundamentally changed the quantity and quality of the realm's coin production – not least the base metal one!⁹ Previously, the base metal coins had been of low quality with respect to weight, shape, durability etc., and it was very difficult and/or very time consuming – and that is expensive – to produce sufficient amounts of base metal coins without new techniques and machinery.

⁸ About the development of Danish banks see e.g. Michael Märcher: Danish banking before and after the Napoleonic Wars. A Survey of Danish banking 1736-1857, in Tuukka Talvio & Cecilia von Heijne (ed.): *Monetary boundaries in transition. A north European economic history and the Finnish War 1808-1809*, Stockholm 2010, 127-143.

⁹ About the mints' development, see the references in note 2 and Michael Märcher: The transfer of minting techniques to Denmark in the nineteenth century, in Nicholas Holmes (ed.): *Proceedings of the XIVth International Numismatic Congress: Glasgow 2009*, Glasgow 2011, vol. II, 1725-1733.

The years from c. 1815 until the 1830s was probably the period with the largest degree of copper circulation (in practise almost a copper and paper standard) ever in Denmark, which was only possible due to the qualifications of the new copper coins, e.g. higher denominations, mentioned above – and probably also to the economic recession during the 1820s. The lack of economic growth in the 1820s did not increase the demands for coin or generate financial surplus to start up investments or production – no small coins of base metal or silver were produced in the 1820s. The latter must also be explained by the fact that the copper coins from 1812-1819 were almost numerous enough to meet the demands – they probably provided some of the best demand-coverage on small coins ever seen in the realm until the economic growth from the 1830s and onwards. Complaints about lack of small coins are known from before the recession, which started around 1818-1819, and again from the 1830s, but not from the 1820s.

1830-50s

As the National Bank took over the responsibilities and tasks of the Bank of the Realm, it also became responsible for the rigsbanktegn. In this way, the National Bank was involved in the control of the coin supply from its founding. This became important in the 1830s as the National Bank due to fortunate economic development from c. 1830, the notes' rise to par (1838) etc. progressively had the financial opportunity to start the desirable substitution of the rigsbanktegn with real coins.¹⁰ It led to the production of c. 2 million pieces of 1 skilling and almost 800,000 pieces of ½ skilling (fig. 7) in copper at the mint in Copenhagen in the second half of the 1830s. The withdrawal of the 16 skilling rigsbanktegn started in 1839, while the rest of the rigsbanktegn was withdrawn from 1843.

The withdrawals and the important monetary reforms intended to create a common and homogenous monetary circulation in both the kingdom and the duchies resulted in new production of copper coins, which were part of an entirely new and complete coin series from around 1842. In the new series, the copper coins were 1/5, ½, 1, and 2 skilling (fig. 8) – the very small denomination 1/5 skilling was advantageous for calculations etc. between the new monetary system from 1813 in the kingdom and the older (courant)-system in the duchies: 1 skilling in the duchies equalled 3 1/5 skilling in the kingdom.

The production of copper coins c. 1842-1843 was so large that except for an amount of the 1/5 skilling no other copper coins were produced before the First Schleswig War between the kingdom and the duchies 1848-1850. The many new copper coins quickly spread widely due to the substitutions, and six of them are found at Koldekilde – none of the 1/5 skilling, which were most relevant for the Southern and Western parts of the realm, and none of the biggest copper coin, the 2 skilling – but five pieces of 1 skilling and just one ½ skilling. The copper coins from around 1842-43 constituted by far the largest part of the copper coins in circulation until the 1850s, when they were – not substituted – but massively supplemented by large-scale copper and bronze coinage.

The First Schleswig War started with the formation of the Provisional Government for the Duchies on 23rd March 1848 and its conquest of the fortress in Rendsburg at the border between Schleswig and Holstein on the next day. Already on 27th March 1848 the royal mint in Altona and parts of its precious metals were taken over without violence by the Provisional Government, who used the mint for a production of copper coins and medals during the war. The copper coins were produced due to continuous shortage of small coins in the duchies. This shortage was created by the official withdrawals of courant coins in the 1830-40s and the Provisional Government's ban on the rigsbank coins introduced from the reform in 1813. The

¹⁰ The National Bank in 1835 stopped using its surplus on the withdrawal of notes to raise their value. Thereafter the bank let general growth and the increasing silver circulation raise the notes to par. The bank therefore had idle money from 1835 and especially until 1845 with the reintroduction of the silver standard/the notes' convertibility with silver.

decision about a new copper coinage at the mint in Altona was taken in late 1849, but the coins were not produced until the second half of 1850. Two new types were made, c. 400,000 pieces of sechsling and c. 200,000 pieces of dreiling with the two lions for Schleswig and the nettle leaf for Holstein (fig. 9). These coins were distributed through the important public office in Rendsburg. They were withdrawn when the kingdom won the war. None of these copper coins for the duchies are found at Koldekilde.

After the war a thorough monetary reform took place around 1854.¹¹ It included both large-scale copper coinages 1852-1855, and from 1856 the replacement of copper by bronze as metal for the base metal coinage. The introduction of the bronze and the first bronze coinage involved several interesting technical and monetary aspects; therefore the next chapter is devoted to an excursus on this important development – and the bronze coinage 1856-63.

The copper coinage took place in Copenhagen 1852-1855 and consisted of almost 5 million pieces of 1 skilling and almost 600,000 pieces of ½ skilling (fig. 10). These coins were part of the reform and needed for the implementation of the new realm standard from 1854 consisting of the following coins: 2, 1, and 1 rigsdaler in silver as standard coins, 16 and 4 skilling in silver and 1 and ½ skilling in base metal as small coins. Many of the withdrawn rigsbanktegn were used for this last Danish copper coinage, which spread widely through most of the realm and circulated in the kingdom until the reforms of the 1870s. The duchies were separated from the kingdom after the Second Schleswig War in 1864.

None of the 1 skilling and only two pieces of ½ skilling from this copper coinage are found at Koldekilde, which is surprising in relation to the size, period of circulation, and type distribution of the coinage. This is perhaps just accidental, but can perhaps be explained by the reform's focus on the alteration of the circulation in the duchies and eventually some other regions of the realm without a dominating circulation of *coins of the realm* – and Bornholm was not one of them.

Excursus: Introduction of bronze coinage in the 1850s

Several countries stopped producing small coins of copper in the second half of the 19th century. They replaced the copper with bronze: different alloys of copper, tin, and zinc new to most countries as a metal for coins. Bronze was harder and stronger, and the coins' motif was sharper making it more difficult to counterfeit them. It was also easier to cast bronze than copper, and the bronze alloys were cheaper.¹² Sweden, Denmark, and Norway started using bronze instead of *pure* copper for small coins in 1855, 1856, and 1860s respectively.¹³ The mint in Paris had for some years conducted large-scale production of bronze coins, and before starting their own bronze coinage both Sweden and Denmark obtained information from Paris.¹⁴

The Danish chemist Bernhard Levy¹⁵ (1817-1863) was in charge of the new French bronze coinage, and in the spring of 1856 he sent a report about bronze coinage to the Danish Ministry of Finance. The report was probably motivated by an inquiry from the

¹¹ About the reform, see the references in note 2.

¹² Tin was a bit more expensive than copper, while zinc was much cheaper than copper.

¹³ Finland and Russia e.g. used copper for small coins into the 20th century. Bronze was only a new coin alloy in our modern understanding; it had also been used for coins in ancient times.

¹⁴ Sweden had also obtained information about bronze coinage from Strasbourg. Norway sent the important mint master in Kongsberg, C.H. Langberg (1811-1888, mint master 1836-1888), on a study tour to Copenhagen, Altona, Berlin, and possibly several other German mints in 1863. The purpose of this tour was both the purchase of an Uhlhorn coining press and of dies, and to gather information about new minting techniques, especially production of bronze and nickel small coins.

¹⁵ B. Levy was born in and studied chemistry in Copenhagen. He became professor in Berlin and later mint director in Bogotá, Columbia. After several years of work in Paris he was in 1853 employed at the Paris mint.

entrepreneurial medallist F.C. Krohn (1806-1883, fig. 11) at the mint in Copenhagen. In 1856 Krohn successfully investigated possibilities for the melting and casting of bronze for coins at the foundry and machine factory H. Gamst & H.C. Lunds Efterfølgere in Copenhagen. Krohn was as medallist, sculptor, and collector of coins and medals very interested in metal alloys, and his investigation was without doubt prompted by the international development of bronze in coinage.

On the basis of Krohn's preparatory work and Levy's report, the Danish Ministry of Finance in summer 1856 decided that the two lowest denominations of small coins – ½ and 1 skilling – were to be made of bronze (fig. 12). Krohn was in fall 1856 deeply involved in the design of the new coins and the different trials etc. The other persons involved made great use of Levy's report which was communicated in August to the mint in Altona from the mint in Copenhagen. The report e.g. dealt with methods and problems regarding alloying, casting, assaying, and annealing. The bronze e.g. required an additional 0.5% of zinc to get the correct alloy due to evaporation of zinc during the melting.

The mint in Altona was to produce the first new bronze coins, as the mint in Copenhagen was working on a massive production of 16 skilling of silver. Coins were to be produced quickly due to the reform. The Ministry of Finance 1856-1857 received complaints about lack of small coins especially ½ and 1 skilling from most parts of the realm. Several of the complainants pointed out that in their area more coins were withdrawn than put into circulation.

The bronze alloy was to be 90% copper, 5% tin, and 5% zinc. Levy had in his report recommended this alloy even though it was not the alloy used in France. The Danish alloy was cheaper due to its high content of zinc, and it was relatively easier to cast and work over. For the Ministry of Finance the lower costs were probably decisive. The problem was the colour of the alloy, which resembled gold. Neither Levy and apparently nor the Ministry saw this as a problem, since gold coins were much less common in the realm's coin circulation than in e.g. France'.¹⁶

In 1856-1857 it was sometimes difficult to obtain the metals for the bronze coinage. The metal for the first bronze coins included withdrawn copper coins from the mint in Copenhagen and tin and zinc bought in Hamburg by M. Levy at the mint in Altona. The bronze strips were produced by Gamst & Lund in Copenhagen, who sent the strips to the mint in Altona, from where parts of the production were returned to Copenhagen. The heavy shipments of raw materials were expensive, but the mint in Altona had to conduct the purchases of metal in Hamburg. The purchases were coordinated from Copenhagen via the relatively new and first Danish telegraph line Elsinore-Copenhagen-Korsør-Sprogø-Nyborg-Fredericia-Flensborg-Rendsburg-Altona-Hamburg from 1854. As the necessary metal could not always be obtained in Copenhagen, the Ministry of Finance unsuccessfully tried to persuade the Ministry of War to sell obsolete canons etc. from the arsenals to the mints. Gradually, the mint in Copenhagen, copper works in the duchies, and especially – from 1857 – different companies in Copenhagen supplied most of the metal. The tin and zinc used were often Silesian zinc in sheets and tin from Asia in blocks (Banca tin).

The new bronze coinage demanded new techniques and work flows. Melting and casting of base metal were key issues. Normally the mints had acquired strips for copper coins and then rolled them to the correct thickness. The bronze strips were cast by the aforementioned company Gamst & Lund, as the mints lacked the skills and/or equipment for the melting and casting of base metals. The Technical University of Denmark was involved from the beginning and cooperated in the alloying and in the assaying. The latter was very thorough in the beginning. It was not possible or necessary, nor economical or operational, to assay a base metal alloy for ½ and 1 skilling thoroughly during normal coin production. The

¹⁶ Denmark started using a more expensive and darker bronze alloy (95% copper, 4% tin, and 1% zinc) in 1873. This was part of the new monetary system incl. gold standard. The new alloy had the same composition as the one used by France and Sweden in the 1840-1850s.

Technical University successfully suggested a tolerance of 0.5% for the tin and zinc content, almost the same as in France. Only samples were assayed, when Gamst & Lund was able to produce strips with the correct content without problems. The samples were typically the first or last strip from each casting. This practise roughly corresponded with recommendations from B. Levy and the Technical University.

Gamst & Lund cast the first strips in early autumn 1856. Different trial strikes and other experiments to determine the weight and size of the future small coins were conducted (fig. 13). When alloy, motif, weight etc. had been determined, six strips were sent to the mint in Altona in November. Four of them were just barely within the tolerance; the last two contained too much tin and too little zinc. The mint in Altona was to coin the strips and send trial pieces back to the Ministry, but did not manage to do so. Mint master Alsing (1856-1863) in Altona wrote back to the ministry 3rd December

“All the strips were so hard that they during the first rolling, which was done with every precaution, they immediately cracked in both sides so they looked like a crude saw ... [the planchets later] had to be cut out free-hand ... The strips cracked even more during the continued rolling, so they ended up as nothing but short bits. They all demonstrated such a hardness and brittleness during the cutting out than several planchets broke in half ... the last strip from melting number 3 was better than the rest, while the first strip from the same melt was so hard that it burst into small bits like glass.”

New strips were cast in Copenhagen and sent to Altona, and this time the strips' metal content was almost like the correct alloy. The processing in Altona went much better this time, and in December Alsing sent trial pieces and wrote to the ministry that “The metal received was significantly better with regards to ductility ... could be rolled rather well ... however, the metal has lost considerably in appearance by being cast in sand. The strips are regular and well-cast, but all the pitting and the sand within the strips appear during rolling. A major part of the planchets therefore, like all silver cast in sand, become crude and unattractive and this appearance cannot be improved by any operation at the mint.”

The bronze also wore down the rolls, and Alsing did not dare to coin the almost 300 kg bronze strips at the mint. However, the ministry was satisfied with the trial pieces and by now wanted the bronze coinage started. Alsing was quickly telegraphed that he should continue the production strongly. At the same time, Gamst & Lund was told to continue strip production and as far as possible change to casting in iron moulds instead of sand moulds. The mint in Altona lent eight iron moulds to Gamst & Lund, and the company bought numerous iron moulds and started casting in iron in the spring of 1857.

The bronze coinage progressed quickly from December 1856 and this led to the production of a lot of scrap metal (punched-out strips). Alsing used the punched-out strips to conduct several successful experiments in melting and casting (in iron moulds) at the mint in Altona. Strips from the experiments were sent to Copenhagen to be assayed. The results were that the used strips with addition of extra zinc could be melted in the new melting furnaces at the mint in Altona without exceeding the tolerance. So there was no reason to send the used strips in Altona to Copenhagen for melting, and at the same time the mint in Altona could be self-sufficient with strips in February 1857 when the winter with sea-ice hindered shipments from Gamst & Lund. Although the mint in Altona itself could cast usable strips in 1857, the mints' own production of bronze strips did not start before 1859 due to the ministry's contract with Gamst & Lund 1856-1857.¹⁷ The company from October 1856 to September 1857 delivered 252 cases with almost 19 tons of strips cast in sand moulds and almost 17.5 tons of strips cast in iron moulds.

More than 9 million pieces of 1 skilling were produced 1856-1858 – and more than 5 million pieces were produced 1860-1864. They were very quickly distributed within the realm

¹⁷ The first production of base metal coins from scratch at the mints in the 19th century was a production of bronze cents for the Danish West Indies (now U.S. Virgin Islands) in 1859.

– in the beginning they were sent directly from the mint to different public offices. Trial pieces of ½ skilling were sent to the ministry for approval in 1857. They were successful and the production of almost 2 million pieces of ½ skilling continued without any problems since the procedure was well implemented after the production of millions of 1 skilling. These high production numbers can be seen at Koldekilde: 33 specimens of the bronze 1 skilling are found there, which indicates the wide and apparently easy distribution of the new bronze coins, but also – when combined with the information from Koldekilde previously presented – that the number of coins at Koldekilde (diagram 1) can generally be related to the mints' output (table 1-4) and coin availability, and probably not to changes in coin use.

The bronze coins greatly supplemented the circulating stock of copper coins, and they probably comprised the main part of the base metal coins in circulation already in the second half of the 1850s. The latest complaints from the public with demands for small base metal coins I know of from the 17-19th centuries are from 1856-1857. In the second half of the 1850s, the domestic supply of the smallest small coins was sufficient – probably for the first time ever in a fully monetised Denmark. A sufficient supply is conducive for monetary stability and economic prosperity. The introduction and massive production of bronze coins are therefore extremely important and constituted a significant change in Danish coin circulation.

This development with sufficient supplies from the middle of the 19th century was initially only possible due to the introduction of and investment in new techniques: Industrialized mints producing huge quantities of high-quality small coins of modern coin metals/alloys. The outer vital circumstances were amongst others a firm monetary policy from 1813 and economic prosperity from c. 1830. The economic and monetary policies were part of the government's general 19th century state-/nation-building policy.

Base metals and modern coin production 1867-1920

As the duchies were separated from the kingdom after the Second Schleswig War in 1864, there was no need for any production of small coins 1865-1866. A new production of bronze 1 skilling – and silver 4 skilling – started in 1867 based on withdrawn coins. This relatively small production of small coins was the beginning of a new era in Danish small coins production. From 1867 until today the only remaining Danish mint (Copenhagen) has almost every year produced some small coins to supplement the country's now sufficient coin circulation. Almost annual small productions replaced fewer larger productions with several years' intervals. This was beneficial for the planning and operations at the mint. It was one of several steps in the 19th century towards modern coin production with more planning of the production and a continuous supplementing of the circulation of small coins. This more stable production is also indicated by the coin finds from Koldekilde: Each decade from 1870 to 1919 are in Diagram 1 represented by between 21 and 39¹⁸ coins, which is a much more even distribution than earlier.

The next important changes in Danish small coins production were the reforms of the 1870s with the introduction of the gold standard, decimal coinage (1 krone = 100 øre), the new krone and øre denominations, and the Scandinavian Monetary Union.¹⁹ The new system consisted of 20 and 10 kroner of gold, 2 and 1 krone(r) and 25 and 10 øre of silver, and 5, 2, and 1 øre of bronze. The system with gold, silver, and bronze continued until the next important changes around 1914-1920.²⁰ After c. 1920 all the Danish coins are of base metal, i.e. cupro-nickel substituted silver, but the three colours were and are still used in Danish coinage. So are the krone and øre system. Now the Danish 20 and 10 kroner are gold-coloured

¹⁸ The decade 1870s is overrepresented due to the coins without readable dates.

¹⁹ About the reforms, see the references in note 2 incl. their references.

²⁰ For information about the changes c. 1914-1922 see this paper in this volume: Michael Märcher: The Finnish 1 markka 1922 – An exceptional coinage in Copenhagen.

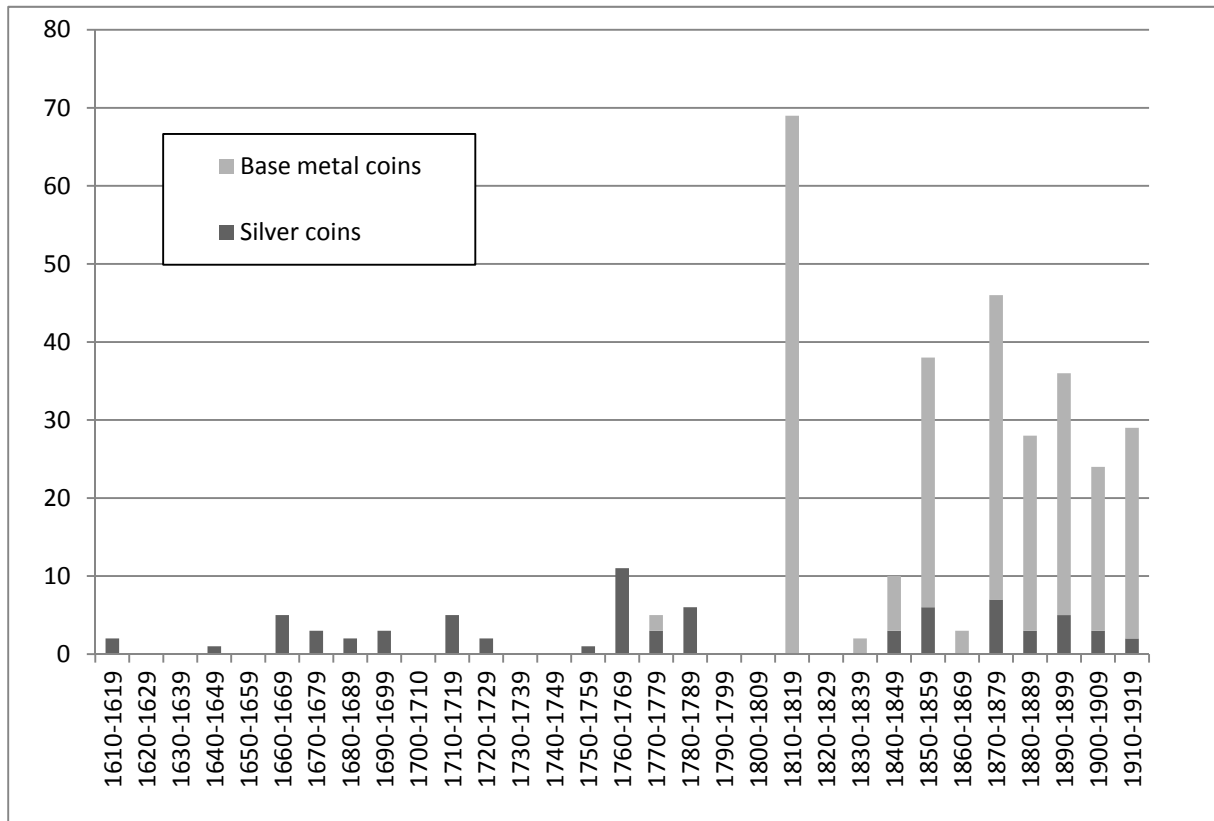
(aluminium bronze), the 5, 2, and 1 krone(r) are silver-coloured (cupro-nickel), and the 50 øre are of bronze and bronze-coloured or actually copper-coloured according to the mint – it does not matter, both materials have a long and important history as the smallest denominations in Danish coinage.

Summary

The production of base metal coins in the realm and the coins found at Koldekilde demonstrates the development of base metal coinage in the Danish monetary system. The first important copper coinage took place 1771-1786, but the turning point in the use of copper coins was the decade 1810-1819, when large-scale production of high-quality copper small coins with high and low denominations happened, while no silver small coins were produced and old ones were withdrawn or had disappeared from circulation during the Napoleonic Wars. The supplies of small coins were – for probably the first time ever – almost sufficient c. 1815-1830 due to economic development, monetary policy, and the newly industrialised coin production.

The next major change in Danish base metal coinage was the introduction of bronze coinage in the second half of the 1850s. Bronze coinage quickly replaced copper coinage as part of the important monetary reform of 1854, and bronze is still used for Danish coins. The circulation of small coins was supplemented with more than 15 million bronze coins 1856-1864, and for the first time ever the stock of base metal small coins was sufficient to meet the continuing and increasing demands. This significant development was a prerequisite for a change towards modern small coins production at the mint in Copenhagen from the second half of the 1860s with annual production to maintain a sufficient supply of small coins. These developments were conducive to monetary stability and economic prosperity.

Diagram 1: Coins from 1610-1919 found at Koldekilde



Notes: 1) Antedated coins are placed according to the year on the coins,
 2) 17 coins (16 from 1850-1902) without readable dates are placed in the earliest possible decade.

Table 1-4: Base metal coinage 1813-1872

Table 1: Copper coinage 1813-1851 at the mint in Altona

Nos	Start	Stop	Coin type	Amount (rigsbankdaler.skilling)	Pieces
1	18 th Jan. 1813	14 th July 1813	1 skilling (H.* 17)	32,000.00	3,072,000
2	26 th Sept. 1814	1 st . Feb. 1815	16 skilling (H. 18)	154,900.00	929,400
3	28 th Jan. 1842	3 rd . Mar. 1842	1/5 skilling (H. 13A-B)	1,215.00	583,200
4	13 th July 1842	31 st Oct. 1842	1 skilling (H. 11B)	12,187.00	1,169,952
5	10 th Apr. 1843	18 th May 1843	1/5 skilling (H. 13B)	1,246.00	598,080
6	June 1847	June 1847	1/5 skilling (H. 13B)	115.00	55,200
7	2 nd Nov. 1850	5 th Dec. 1850	1 sechsling (H. 19)		202,578
8	19 th Dec. 1850	9 th Jan. 1851	1 dreiling (H. 20)		202,892
9	1 st Jan. 1851	1 st Feb. 1851	1 sechsling (H. 19)		162,836
				201,663.00**	6,976,138

*H. = Holger Hede: *Danmarks og Norges Mønter 1541-1814-1977*, 3. rev. Edition, Copenhagen 1978).

**The value of the courant coins issued by the Provisional Government for the Duchies is excluded from the total. 1 sechsling = 1/2 skilling; 1 dreiling = 1/4 skilling.

Table 2: Copper coinage 1813-1855 at the mint in Copenhagen

Nos	Start	Stop	Coin type	Amount (rigsbankdaler.skilling)	Pieces
1	March 1813	Sept. 1813	1 skilling (H. 17)	34,504.69?	3,312,453?
2	24 th Nov. 1813	9 th Mar. 1814	12 skilling (H. 19)	157,403.12	1,259,225
3	10 th Jan. 1814	3 rd Mar. 1814	6 skilling (H. 20)	100,621.36	1,609,942
4	19 th July 1814	3 rd Nov. 1814	16 skilling (H. 18)	406,149.80	2,436,899
5	19 th Aug. 1814	7 th Nov. 1814	12 skilling (H. 19)	75,896.00	910,752
6	22 nd Feb. 1815	16 th May 1815	3 skilling (H. 22)	83,172.42	2,661,518
7	11 th Mar. 1815	19 th June 1815	4 skilling (H. 21)	102,566.72	2,461,602
8	22 nd May 1815	1 st Sept. 1815	16 skilling (H. 18)	260,537.16	1,563,223
9	18 th Dec. 1815	1 st Apr. 1816	2 skilling (H. 23)	102,297.88	4,910,300
10	10 th Aug. 1818	11 th May 1819	1 skilling (H. 37)	20,470.38	1,965,158
11	25 th Feb. 1819	20 th Apr. 1819	2 skilling (H. 36)	14,980.26	719,053
12	14 th June 1831	1831	1 skilling (H. 37)	10,450.00	1,003,200
13	Mid-1835	Mid-1835	1 skilling (H. 37)	10,329.12	991,596
14	23 rd Mar. 1838	9 th Apr. 1838	1/2 skilling (H. 38)	4,057.00	778,944
15	1842	1842	1/2 skilling (H. 12)	4,398.00	844,416
16	1842	1842	2 skilling (H. 10)	1,082.00	51,936
17	12 th Apr. 1849	1 st June 1849	1 skilling (H. 11A)	9,404.24	902,808
18	10 th Jan. 1852	29 th ? Jan. 1852	1 skilling (H. 12)	9,915.08	951,848
19	1 st ? Feb. 1852	1852	1/2 skilling (H. 13)	3,098.88	594,992
20	29 th Aug. 1853	4 th Nov. 1853	1 skilling (H. 12)	25,286.55	2,427,511
21	11 th Jan. 1855	31 st Mar. 1855	1 skilling (H. 12)	5,817.10	558,442
22	April 1855	Aug. 1855	1 skilling (H. 12)	9,411.03	903,459
				1,451,849.07	30,506,824

Table 3: Bronze coinage at the mint in Altona 1856-1861

Nos	Start	Stop	Coin type	Amount (rigsdaler.skilling)	Pieces
1	Dec. 1856	March 1857	1 skilling (H. 16B)	14,152.91	1,358,683
2	April 1857	Jan. 1858	1 skilling (H. 16B)	82,830.68	7,951,748
3	May 1857	Jan. 1858	½ skilling (H. 17B)	10,191.44	1,956,760
4	Sept. 1860	March 1861	1 skilling (H. 16B)	25,075.02	2,407,202
				132,250.13	13,674,393

Table 4: Bronze coinage at the mint in Copenhagen 1863-1872

Nos	Start	Stop	Coin type	Amount (rigsdaler.skilling)	Pieces
1	25 th Sept. 1863	22 nd Jan. 1864	1 skilling (H. 16A)	30,490.80	2,927,120
2	19 th July 1867	6 th Sept. 1867	1 skilling (H. 6)	10,194.80	978,704
3	26 th Aug. 1868	17 th Oct. 1868	½ skilling (H. 7)	4,817.24	924,912
4	28 th Oct. 1869	6 th Dec. 1869	1 skilling (H. 6)	5,101.61	489,757
5	5 th July 1870	8 th Aug. 1870	1 skilling (H. 6)	4,680.43	449,323
6	15 th Dec. 1870	3 rd Feb. 1871	1 skilling (H. 6)	7,147.32	686,144
7	9 th Feb. 1872	25 th Mar. 1872	1 skilling (H. 6)	14,685.60	1,409,820
				77,117.92	7,865,780





Fig. 1: The only Danish plate money, copper 1714, c. 66x76x7 mm, 248.24 grams. It is a trial piece, made by the mint master Christian Wineke in Copenhagen. He tried to get permission to start up a production, but he was not successful. The National Museum of Denmark, The Royal Collection of Coins and Medals.



Fig. 2: ½ and 1 skilling from 1771-1786, all were antedated with the year 1771, copper.



Fig. 3: 3 and 12 skilling 1812, copper. The 12 skilling is a re-struck 1 skilling from 1771-1786. The motif of the 1 skilling could be seen on most of the quickly struck 12 skilling. The first 12 skilling is perhaps a bit worse than the average one. The second is probably one of the worst existing specimens; due to the *mask* it got the nickname *Hannibal the Cannibal*. The second is privately-owned, photo by Frank Vedel.



Fig. 4: 1 skilling 1813, copper.



Fig. 5: The six different rigsbanktegn, 2, 3, 4, 6, 12, and 16 skilling 1813-1815, copper.



Fig. 6: 1 and 2 skilling 1818, copper.



Fig. 7: 1/2 skilling 1838, copper.



Fig. 8: $\frac{1}{5}$, $\frac{1}{2}$, 1, and 2 skilling 1842, copper.



Fig. 9: 1 dreiling and 1 sechsling 1850 issued by the Provisional Government for the Duchies, copper.



Fig. 10: $\frac{1}{2}$ and 1 skilling 1852, copper.



Fig. 11: The medallist F.C. Krohn (1806-1883). Etching by his son Pietro Krohn (1840-1905) from 1865. The National Museum of Denmark.



Fig. 12: 1/2 and 1 skilling 1857 and 1860, bronze.



Fig. 13: Many experiments were made to arrive at the standard weight for the new bronze coinage. The National Museum of Denmark, The Royal Collection of Coins and Medals, has more than 41 samples with at least 20 different weights. The numbers on these three, 140, 150, and 160, are the number of coins per pound, c. 470 gram. The experiments ended with 120 coins per pound, so the Danish bronze 1 skilling from 1856 weighs almost 4 grams.

Contents

Georges DEPEYROT, <i>Introduction</i>	3
---	---

Part 1

Business with Money: Monetary Politics and Capital Flows in the Era of the First Globalization,
Session of the *European Business History Association* and *Business History Society of Japan*,
Paris conference on *Business enterprises and the tensions between local and global*,
Aug. 30 – Sept. 1, 2012

Catherine BRÉGIANNI, <i>Introduction</i>	7
Vladimir BAKHTIN, <i>Foreign loans and investments in the Russian Empire in the second half of the 19th century</i>	9
Catherine BRÉGIANNI, <i>Monetary and numismatic mechanisms as an echo of economic globalisation: the Greek paradigm of the 19th century</i>	19
Michael MÄRCHER, <i>The Finnish 1 markka 1922 – An exceptional coinage in Copenhagen</i> ..	43
Rita MARTINS DE SOUSA, <i>The Lisbon Mint during the Era of the First Globalisation</i>	63

Part 2

Small change: bronze or copper coins from Antiquity to 19th c.,
Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Paris, École Normale Supérieure,
May 13-14, 2013

Catherine GRANDJEAN, <i>Les débuts de la monnaie de bronze dans le monde grec</i>	75
Constantina KATSARI, <i>Exceptional restrictions in the circulation for bronze coinages in Roman eastern provinces</i>	85
Claudia DE LOZANNE JEFFERIES, <i>The role of copper money within the dynamics of sovereign debt and the perception of unsound fiat money in early 17th- century Castile</i>	91
Michael MÄRCHER, <i>Bronze and copper coins in 19th century Denmark – and found at Koldekilde on Bornholm</i>	103
Sylvain MICHON, <i>L'échange interrégional et international des espèces divisionnaires en cuivre par les voies fluviales et maritimes au XIXe siècle, L'exemple du don A.V. Castet au Musée de Sète en 1890</i>	123
Emmanuel PRUNAU, <i>La question du cuivre-papier, les banques de sols et la loi du 24 germinal an XI</i>	147
Brigitte TOUITOU-MICHON, Sylvain MICHON, <i>Mémoire de Léonard de Martin Nadaud ou De l'usage du sou au XIXe siècle en France</i>	171
Raf VAN LAERE, <i>The Nieuwerkerken hoard and the circulation of copper coins in the Prince-Bishopric of Liege during the late 18th century</i>	179

Part 3

Transfers of precious metals and their consequences, 16th – 19th,

Round Table of the "Silver Monetary Depreciation and International Relations" program
(ANR DAMIN, LabEx TransferS), Madrid, Casa de Velázquez, May 16-17, 2013

Patrice BAUBEAU, <i>Money, That Obscure Object of Desire</i>	231
Allison Margaret BIGELOW, <i>Lost in Translation: Knowledge Transfers and Cultural Divergences in Early Modern Spanish and English Silver Treatises</i>	237
Catherine BRÉGIANNI, <i>Stories and myths: Greek gold transfers during the World War II and beyond</i>	261
Juan E. CASTAÑEDA, <i>A new estimate of the stock of gold (1492 - 2012)</i>	271
Dennis O. FLYNN, Marie A. LEE, <i>A Restatement of the Price Theory of Monies</i>	293
Claudia DE LOZANNE JEFFERIES, <i>Silver production in 17th- century Spanish America: A preliminary analysis of its volatility, trajectory and possible effects on the Castilian monetary system</i>	315
Elisabeth KASKE, <i>The Revenue Imperative: Silver vs. Copper Coin in Government Finance in 1850s China</i>	325
Marina KOVALCHUK, <i>Japan. Adoption of the Gold Standard: Economic Problem from a Historical Point of View</i>	357
KURODA, Akinobu, <i>What was Silver Tael System? A Mistake of China as Silver 'Standard' Country</i>	391
Claudio MARSILIO, <i>Lisbon, London, or Genoa? Three alternative destinations for the Spanish Silver of Philip IV (1627-1650)</i>	399
Rita MARTINS DE SOUSA, <i>Transfers of precious metals and the money supply – Portugal 16-19th centuries</i>	415
Rila MUKHERJEE, <i>An Early Medieval Metal Corridor, Silver, Bengal, Bagan: and Yunnan 7th to the 13th Centuries</i>	431
Emmanuel PRUNAU, <i>Les transports de fonds et l'usage des espèces dans les paiements en France au début du XIX^e siècle</i>	443
Ekaterina SVIRINA, <i>Russian metallic currency of the first half of the 19th century: introductory analytical characteristics</i>	463
Marc FLANDREAU, <i>Specie in the History of Finance</i>	469
Contents.....	473

The specific interaction between the local and the global, but also between the national and the private, demonstrating the globalisation's mechanisms during the last decades of the 19th century, was the central questions examined in the Session "Business with money: monetary politics and capital flows in the era of the first globalisation" organised by C. Brégianni in the framework of the XVI EBHA Conference, Paris, EHESS, 29 August - 1 September 2012. In this Session we tried to apply a comparative approach concerning monetary systems and numismatic activity; we attended to investigate the past experiences of monetary cooperation but also the cultural transfer and the economic asymmetry that coin's fabrication often represents.

The round table "Small change: bronze or copper coins from Antiquity to 19th c.," was organized by Georges Depeyrot in Paris at the École Normale Supérieure in 2013 (13 - 14 May) in the framework of the ANR DAMIN program and of the LabEx TransferS. During this meeting, the participants tried to understand the role of the small coins (copper, bronze, brass, etc.) in the economy, in the monetarisation of societies and the relation between small change and gold and silver coins.

The last round table "Transfers of precious metals and their consequences, 16th – 19th" took place in Madrid at the Casa de Velázquez on 16 - 17 May 2013. It was organized by Georges Depeyrot and Marina Kovalchuk in the framework of the ANR DAMIN program and of the LabEx TransferS with the support of the Casa de Velázquez. The aim was to compare the consequences of the two main arrivals of precious metals in history, during the 16th century and during the 19th century. The choice of Madrid was linked to the role of Spain and Portugal in relation with the first arrival of gold and silver.



M O N E T A

Hoenderstraat 22, 9230 Wetteren, Belgique

FAX (32) 09 369 59 25

www.moneta.be

ISBN 978-94-91384-24-0