Updated version of shorter article published in Russian in : Geologiya v XXI veke. Materialy nauchno-prakticheskoi konferentsii "Satpaevskie chteniya". Almaty 14-15 April 2011 (*Geology in the XXI century. Proceedings of the scientific conference "Satpaev readings", Almaty 14-15 April 2011*). Almaty, 2011, p.425-430.

THE MEDIEVAL URBANIZATION OF NORTHERN CENTRAL ASIA AND THE INTERNATIONAL MONETARY SYSTEM

Renato Sala

Department of Geoarchaeology, SRI-Nomads, Almaty, Kazakhstan; ispkz@nursat.kz

CONTENTS

1 - The Medieval urbanization of Northern Central Asia

2 - The Eurasian monopoly of silver production in Western Central Asia (560-1120 AD)

2.1 - Silver mining in Western Central Asia: four phases

2.2 - International circulation of Central Asian silver

3 - Chach and Talas: mines, mints and the urban park

4 – The Mongols and the dismantlement of the NW-Tienshan urban complex: military destruction or managerial and monetary incompetence?

1 – The Medieval urbanization of Northern Central Asia

During the Early Middle Ages the Middle-Low Syrdarya (6 regions: Chach, Arys, Otrar, Turkestan, Syrdarya left bank, Syrdarya delta) and Northern Tienshan (4 regions: Talas, Chu, Semirechie, NE-Tienshan) have been the theatre of a magnificent integrated urban process, counting a total of 1334 fortified towns covering all together an area of 5000 ha (Fig 1). Half of it developed on the Syrdarya and half on the N-Tienshan piedmonts, but with different periodization (Figs 2, 3, 4).

The Syrdarya urban complex starts as early as the VI BC and blossoms between the I and VIII AD, with a last building peak under Karakhanid rule (X AD). Until the V AD its development is based on irrigated agriculture, and then is accompanied by metallurgy and international trade.

The N-Tienshan urban complex practically starts during the V-VI AD in Talas, capital of the empire of the western Turks, and blossoms all along the northern piedmonts between the VIII and XI AD, somehow immediately successive to the Syrdarya peak development. Turkic tribes are skillful warriors and metallurgists, and the urban development in N-Tienshan is from the very beginning coinciding with the mining, working and trade of polymetal ore.

The XII AD already sees everywhere stasis or small contraction of the process of urbanization. The Mongol invasion of the early XIII AD disrupted the NW-Tienshan and Chach complexes, but barely affected the other oases of the Syrdarya. (Figs 5.1-5.8)



Fig 1 - Syrdarya-NTienshan: number and total of settlements ha per region



Fig 2 - Syrdarya-NTienshan: evolution of total ha of occupied settlements between VI BC and XX AD



Fig 3 - Syrdarya: evolution of total ha of occupied settlements per region between VI BC and XX AD



Fig 4 - N-Tienshan: evolution of total ha of occupied settlements per region between VI BC and XX AD





Figs 5.1-5.8 - Syrdarya-NTienshan: century by century maps of occupied settlements from VI to XIII AD (yellow = towns newly built; red = towns still occupied; white = towns just abandoned)

2 – Eurasian monopoly of silver production in Western Central Asia (560-1120 AD): 4 phases of peak extraction and intermediate silver crises

A large urban complex presupposes division of work, complex interactions, and a general mean of exchange (i.e. money in the form of gold, silver and copper, respectively for large, medium and small size transactions). In fact money allows the independence of the actions of buying and selling and so the acceleration and widening of the market activities. Lack of stable currency always provoked deeper economical crises than wars.

The Medieval urban complex of Central Asia was huge and was of course supported by a sound monetary basis and financial politics. He had coins, minting towns and, most important, the richest silver mines of Eurasia. Here, between the VI and XI AD, silver mines played the same international role played by copper mines during the end of the II millennium BC. From the VI to the XI AD the exploitation of silver deposits made of Central Asia the core of the international monetary system, favoring at first the blossoming of the preexisting urban complexes of the Middle Syrdarya, and then the start and blossoming of the urbanization of N-Tienshan.

Silver deposits provided metal for minting local Central Asian silver coins, for paying tribute at first to the Abbasids and then to the Samanids, with the abundant rest used for supporting massive commercial ventures with silver-hungry countries. Silver is exported in the form of silver objects ¹ (arm-rings, ingots and fragments of ornaments) or coins (dirham with Kufic inscriptions) that, in the case of the Samanid trade of the X AD, are clearly minted for export. The countries of destinations were: the Islamic civilization, which represented the richest economical system of the time; India and China, rich in gold but poor in silver; and then Europe, at the time totally depleted of metal currency and economically depressed.

2.1 – Silver mining in Western Central Asia: four phases

The main regions of Medieval silver mining have been Chach (Ilak, Chatkal, where are respectively documented 15^{2} and 30 mining sites) (Buryakov 1965) and the Talas valley (where 79 mining sites are documented) (Bubnova 1963) (Fig 6). Here are also located most of the metallurgic centers (13 in Chach and 10 in Talas) and a large proportion of minting towns (9 out of the total 19 of the Mid-Syrdarya and N-Tienshan).



¹ Most common were ingots and bars, arm-rings, fragments of ornaments.

² One of the main Chach-Ilak mines has been Lashkerek, exploited during 460-930 AD to the depth of 300 m and then abandoned. In its proximity are accumulated 9-14 thousand tons of slag with 20% of led content (Merkel 2013), witnessing a production of around 400 tons of silver (Kovalev 2003)

Silver is extracted together with gold and base metals (Cu, Pb, Zn, Fe). The main chronological phases of extraction are 4: the first 3 have Chach as main center, the fourth is centered in Talas (Blanchard 2001).

560-670 AD: Panjir (NW Afghanistan) and Chach are producing most of the Eurasian silver, just few tons per year in the VI AD but up to 15 during the VII AD.

710-780 AD: the Panjir mines are exhausted and Chach alone produces an average of 25 tons of silver per year. The total metal output averaged a 53% of silver, a 25% of gold and the remaining 25% of base metals (Buryakov 1965).

850-960 *AD*: the Chach production is paralleled by the one of the Pamirs, and together they provide around 23 tons a year ³. Few polymetal mines are also active in Nuratau, Fergana, Talas ⁴ and Semirechie (Tekely, Muzbulak). Coins are produced under Samanids rule mainly in the mints of Chach and Samarkand, and partly in Balkh and Bukhara. After 960 the silver trade from CA towards Europe drops to 32% and by the end of the century reduces to 5% (Kovalev 2002).

1020-1120 AD: the Chach and Pamirs mines are depleted, and the Talas mines develop up to a production of 23-40 tons per year. The work is done by local and foreign agencies (10000 people from Isfahan are based around Sheldji) and the output, mainly sold to the Ghaznavids, is channeled to India ⁵. Their production strongly decreases after the XII AD ⁶.

After the XII AD, with the exhaustion of the local mines, the silver business abandons Central Asia (a fact that is surely contributing to the huge urban regression that follows) and switches to Europe where new technologies are introduced and new mines are discovered ⁷, allowing a yearly production of more than 20 tons. From that time until the exploitation of the American mines (1550 AD), silver will travel from Europe to the East and gold from China and India to the West ⁸. So, after the XII AD, Central Asia finds itself out of the big game: it manifests internationally its existence a couple of centuries longer through military superiority and booty (Mongols, Timurids), and finally disappears from the international economical and political scenario.

The Medieval average gold/silver price ratio was 5 in China, 14 in Central Asia and Persia, 12 in Europe. The real price of both, silver and gold, doubled after 1350 following the depletion of the

³ Rich silver mines are also discovered and exploited during 875-933 around Balkh, Andaraba, Benjahir (Afghanistan) by the Saffarids (Eastern Iran dynasty) and then by the Samanids. (Merkel 2010).

⁴ The Muslim geographer al-Makhdisi in 995 describes Taraz as "a large fortified town with many inhabitants and parks, four gates and a crowded rabat"; and the main metallurgic towns of Jeldy (Sadyrkurgan), Sus (Chadivar) and Takabket (Aktobe-Talaskoe) in the Talas valley as "located near a mountain with silver ore deposits".

⁵ By the time Europe is already relying on the rich silver mines discovered in 938 in Rammelsberg (Saxony), well protected from Viking raids and theatre of main advances in mining technology, which fixed the legend of the mining dwarves. The mines supported the economical recovery of Europe and the rise to power of the Saxon dynasty (Cowen 1999).

⁶ The Franciscan traveler Rubrouck, entering in November 1253 the Talas delta from the Karatau northern piedmonts, speaks about the presence of precious German slaves who were working as metallurgists in the Talas valley and then stolen and displaced to mine gold in the Borotala valley.

⁷ Particularly important have been the technological improvements realized after 938 at the silver mines of Rammelsberg (Saxony), which spread to the mines of Freiberg (Black Forest) newly discovered in 1200, and then to the ones of Bohemia and of the Eastern Alps. In 1292 starts the exploitation by private enterprises of the rich silver mines of Devon (South England). Each mining complex could in average provide a yearly amount of 10-20 tons of silver. The production of the European silver mines declined (and the silver price doubled) between 1350 and 1450, when it resumed thanks again to the introduction by Saxon miners of a new generation of water pumps, forced ventilation and mining techniques. (Cowen 1999).

⁸ By the start of the XI AD, in the composition of the Northern Russian hoards, kufic material is substituted by Friesian export of German material (Korpela 2008).

Central Asian and European mines, and decreased 4 times after 1550 with the exploitation of the New World mines, which provided a yearly silver supply not by tens but by hundreds of tons. After the introduction of the gold standard (1820) the gold/silver ratio rose to 20 and during the XX century averaged 50 (Fig 7).



1344 1364 1384 1404 1424 1444 1464 1484 1504 1524 1544 1564 1584 1604 1624 1644 1664 1684 1704 1724 1744 1764 1784 1804 1824 1844 1864 1884 1904 1924 1944 1964 1984 2004 Fig 7 - Evolution of the real price of silver(blue) and of the ratio of the gold/silver price(yellow) during 1344-2004

2.2 – International circulation of Central Asian silver

In post-Roman Europe mining and currency are scarce. Gold, in the hands of aristocratic elites, tended to accumulate in hoards, and a poor copper-based coinage allowed small-scale transactions. The transaction of land for service and rents paid in crops rather than money became the basis of the feudal system that was used to run much of Western Europe for the next several centuries (Cowen 1999). The demand for oriental goods decreases, Mediterranean trade fades under the treat of Vandal and Muslim piracy, the internal commerce of the North and Baltic seas develops and will eventually reopen to the east through the Russian plains and rivers. Starting from the VI AD, high denomination currency is searched through trade with Middle East and Central Asia. Imports are precious metals and coins, exports are furs and slaves⁹.

The European import of Central Asian silver started in the VIII AD, blossomed under the Samanids during the first half of the X AD, and faded during the second half of the century. Before the X century silver imports of Central Asian silver dirhams, re-minted in Dorestad into denarii, fuelled the Carolingian prosperity; during the X, silver trade increased under Samanid mining and

⁹ At the large market of Bulghar, on the middle Volga near the present town of Kazan, silver, spices (wine, oil), silk and gems were exchanged against furs, slaves, sheep, cattle, goatskins and leather, hawks, honey, wax, nuts, coriander seeds, grapes and dried figs, maple wood (for bowls), corn, amber, brocade, lengths of cloth, thread, caps, fish-glue and fish-teeth (which might mean walrus ivory), mailcoats and special arrows. Archeologists, excavating sites, have unearthed numerous arrowheads of both iron and bone, specially designed with blunted points for shooting animals without damaging their valuable pelts (the average cost of a fur was 2-3 dirhams). In the Eurasian medieval trade two languages were customarily used as linguae francae, one Iranian and one Altaic (at first Hunno-ian, then Middle Turkic), but 'silent exchange' by exposition of goods was the main mean. Merchants engaged in foreign trade (called gosti, i.e. guests) were wearing swords and gathering (on the sea, on land, in caravanserai and markets) in large solidarity groups.

minting and Varangian control of the routes, fuelling the Saxons' and Ottonians' eastern expansion. After the X, trade between Central Asia and Europe continued with dirham substituted by other commodities like metalware and silk.

Special coins (Kufic dirham, i.e. drachmas with inscriptions in early Islamic style) were expressly minted for export and so were massive silver objects of average artistic quality (Davidovich, Dani 1998). The Kufic dirham was weighting 2.5-2.9 grams and had a silver content but 90% that was debased to less than 50-20% during silver crises.

Trade mainly happened by steps across a sequence of large market towns, hillforts and caravanserais along two waterways, a western and a eastern one, connecting the Caliphate with South and Northern Europe. The western waterway was running from the Caliphate territories across the Mediterranean to and round Spain, with a derivative land road along Italy and Central Europe. The eastern waterway ran directly to the Baltic region across the Russian plains and rivers from Constantinople, the Caliphate and Central Asia by 2 main itineraries: Black sea and Dnieper route and the Caspian and Volga route. The Dnieper routes were crossing the territories of the Early Slavs and Rus-Varangians; the Volga routes the countries of Khazars, Eastern Bulgars (known as Silver Bulgars), Russians and Finno-Ugrians (Bernstein 2008)¹⁰. Their various segments along the rivers Dnieper and Western Dvina, Volga and Don, with portages round rapids and drainage divides (Sarkel, Gnyozdovo, etc), were interconnected by canals and with caravan routes from Middle East and Central Asia., making of the whole area an integrated economical and political zone. In the silver trade, during the IX-XI centuries, the Volga route was provided of a solid trade infrastructure and became the most active, deserving the name of "silver road" or, reversely, "fur road"¹¹.

Of the 1650 dirham hoards found up to now (with a total of half million dirhams), the 81.4% have been deposited during the IX-XI AD in Europe, the 75.2% in the Baltic region, and the 35.43 in Viking Scandinavia (Kovalen & Kaelin 2007). The oldest kufic coin had been unearthed near the Great Nevo Lake (Ladoga, 780 AD) and hundreds of thousands of them in Northern Russia and the Baltic, evidently hidden in periods of unrest (pirates and raiders), clearly brought there from Central Asia across the Russian plains and never recovered until modern times (Hoven 1982)¹². (Fig. 8)

¹⁰ The control of the activity of the Volga route during the VII-X AD switched from the Khazars of the Volga delta to the Bulgars of the middle Volga and finally, at the end of the IX AD, to the Rus-Varangians (Vikings) of the Pre-Baltic region. Historical accounts about those peoples have been written during the X AD by few Muslim geographers like Ibn Khordadbeh, Ibn Rustah, Ibn-Fadlān, al-Istakhri, Ibn Hauqal, Gardizi. About the Varangians of the X AD, Ibn Rustah says: "They harry the Slavs, using ships to reach them; they carry them off as slaves and ... sell them... They treat their slaves well and also they carry exquisite clothes, because they put great effort in trade".

¹¹ Land caravans of 500 men and 3000 animals (camels) packed with silver traveled from Central Asia to Bulghar on the middle Volga in 20 days and here, by summer, were reached by Varangian vessels full of slaves and furs. Here silver was exchanged against northern goods and then re-exported back by boat, mainly to Sweden. Such trade could happen in less than a year time (Ibn Faflan 934). The caravan route from Urgench to the Volga was crossing a very harsh desert but was facilitated at first by wells and castles and, after the IX AD, by the construction of a series of caravanserais made of cut stone 20-25 km far from each other. The main towns of the Volga and Don route were Atil, Sarkel, Bulghar, Bieloozero, Timorovo (Yaroslav), Aldaigja (Ladoga); of the Dnieper route Sambat (Kiev), Gnyozdovo, Lyubech and Holmgard (Novgorod). They were all hosting garrisons employing Oguz and Pecheneg mercenaries.

¹² Half of the 136 coins found in the treasure of Fittja (Upland, Central Sweden) are issued by the rebel ruling houses of the Tahirids of Khorasan (820-867) from the mints of Bukhara, Merv, Samarkand and Chach (wwwunc.edu). But the 75% of the N-European hoards were buried during the X AD, and these ones are overwhelmingly composed of Samanid dirham from Chach and Samarkand mints. Their export happened at the rate of 1200000 dirham per year (3.5 tons of silver, 2.7% of the annual Samanid budget) against a similar value in furs and slaves, peaked during 900-920 AD and declined after 950 (Noonan 2001). The coins found in hoards had a mean circulation time-span of 15-40 years, shorter in E-Europe and getting longer out of scarcity in the Baltic (Kovalev 2011).



Fig 8 - Medieval trade routes between the Ponto-Caspian region and the Baltic (VII-XI AD)

In Europe the main phases of import of precious metals coincide with the first 3 mining phases of Central Asia: 560-670, 710-820, 850-960 (Blanchard 2001) being that the output of the fourth mining phase (Talas 1020-1120) had been mainly channeled to India.

The intervals between the 4 mining phases of Central Asia (670-710, 780-850, 960-1020) coincide with silver crises, not so much in Central Asia itself where anyway in 820 AD silver coins are for a short time debased to the 14% of silver content (Davidovich, Dani 1998), but surely in the surrounding civilizations, and particularly in Europe. Here the occasional re-exploitation of English and German silver mines is well correlated with these interval crises: 640-750, 810-850, 960-1070 (Blanchard 2001).¹³

By 1015 the importation into Europe of Central Asian silver had ceased completely, and the eastern link was broken ¹⁴. A huge international shortage of silver characterizes the centuries after the X AD, which may reflect a steadily increasing demand for coinage, as well as a real shortage of silver. Copper coins are reintroduced everywhere, and also appear the first experiments of paper money (a promise to pay gold or silver or bronze in exchange of a piece of paper) ¹⁵.

¹³ During the interruption of the Muslim silver supply during 820-830, the Carolingian empire broke down and large scale Viking raids increased bringing for a century Western Europe to exhaustion. Dorestad was sacked 3 times in 3 years, and Paris saved itself by paying a bribe of 3.5 tons of silver, starting a tradition of structural extortion (Cowen 1999). With the start of the X century, some Vikings reactivated the eastern routes of silver trade, and the Western European power resurged in the safer upstream territory of Saxony.

¹⁴ "Around 965-70, the stream of Kufic silver coins from Bulghar (on the middle Volga, near the modern town of Kazan) dried up, and the market of Birka (Central Sweden) ceased to flourish. The silver mines in Asia had begun to fail, and the latest date on coins found in Russia is 1015. Alternative sources for silver for Scandinavians were Germany and England, and by the 10th century Byzantine coins also appear, although never in the same quantities as the Kufic ones of the earlier period." (wwwunc.edu). With the closing of the Volga route and of the western export of Central Asian silver, several rich towns along the eastern road (Atil, Bulghar, Gorodishe, Timerevo, etc) and on the Baltic (Birka) decayed or vanished.

¹⁵ Actually, the first paper money already appeared under the Tang dynasty (698-907) but limited to specific transactions, like the payment of the traders of salt, which was a state monopoly item. It is with the Song dynasty

3 – Chach and Talas: mines, mints and the urban park

The periodization of mining in NW Central Asia is strictly coincident with the general peak of urbanization of the Middle Syrdarya and Northern Tienshan during the VI-XI centuries, and in particular with the very start and end of the urban complex of NW-Tienshan. In particular, the effects of the Central Asian mining activities are evident in the evolution of the urban park of Chach during the IV-VIII AD and of the Talas valley during the VIII-XI AD.

In *Chach* the main building phases are three: the IV, mainly the VI and, slightly and finally, the X century AD. Of the newly built towns, the 15-20% consists of metallurgic centers built at the periphery of the mining areas (a total of 13 units) or of large minting towns (a total of 8 units). The urban expansion of the IV - early VII AD is clearly connected with the first and second phase of silver extraction; the one of the X AD with the third phase. The urban contraction of IX AD is connected with the diminution of the mining activity, and is followed in XI AD by another contraction that saw the abandonment of 1 mint and 2 large metallurgic centers. After the Mongol invasion (XIII AD) only 2 metallurgic centers and (possibly) 3 mints are left (Buryakov 1965) (Fig 9, 10)

The region, with its rich agricultural and mineral potential and located on interregional roads, blossomed under the Samanids, when became the main minting center of the empire. The Muslim geographers Ibn Khordadbeh (870) and al-Muqaddesi (945) are quoting Chach-Ilak as a main region of silver extraction. Ibn Hauqal (977 AD) refers that the minting of silver dirhams in Transoxania happened in two places, i.e. in Deinket (Tunket, Kuliata) capital of the Ilak mining region (Chach) and in the city of Samarkand.¹⁶

⁽⁹⁶⁰⁻¹²⁷⁹⁾ and the silver crisis of 1150 AD that the use of paper money became officially generalized, at first with regional validity and then, one century later, as national currency.

Also the Muslim world introduced monetary innovations in the form of cheques, letters of credit and promissory notes, saving and transactional accounts, loans, trusts and exchange rates. But here the experiment of a national paper currency happened only in 1294 under the Mongols, by the decreed of the Mongol ruler Gaykhatu of the Il-khan dynasty who, imitating the Chinese example, introduced a national paper currency holding a text in Arabic and Chinese.

The sort of such early introductions of national paper money drove to ruinous excessive emissions, inflation, and popular upheaval, so that its circulation ended up by being abolished: the Chinese experiment lasted almost 2 centuries, until 1311, and the one of the Il-khan dynasty just 6 months.

In Europe, where the first paper mills appeared only in 1150 (in Spain under Moorish rule, almost 1000 years after China), the introduction of paper money has been quite late and slow. The earliest use of its simplest forms (promissory notes and bill of exchange) is documented during the XIV AD, actually in 2 most proximate doors to the Muslim world: first in Sweden, intended for solving the problem of an excessive circulation of copper coins; and then in Italy, where the longstanding wealth of the mercantile towns made its use irreversible. Eventually the first European banknotes have been issued by the Stockholm Banco in 1661. By supporting a circulation volume much higher than its metallic guaranty and by passing around the prohibition of usury, paper money became the root of the modern financial system (Cribb J. 2000).

¹⁶ These accounts are confrmed by 2 archaeological studies concerning the origins of the materials of the Baltic hoards. The first article (Merkel et alia 2013) is concerned about the origin of the material of 54 silver samples from the Hedeby hoard (Sweden): 31 items come from Chach mines, 5 from Nuratau, 11 from Bactria, and 12 from Samarkand mints which were using a blend of silver ore. The second article (Kovalev 2003) is concerned about the original mints of the hoard's coins. It attributes the 54% of Samanid dirhams found in N-Europe to Chach mints, the 38% to Samarkand mints and only 4% to the capital Bukhara. Focusing on the production of the Chach mint, he finds that the 98.3% of all the existing Chach coins have been discovered in N-European hoards and that, of these hoards, Samanid (X century) dirhams from Chach constitute the 83.1%.



Fig 09 - Chach-Keles: evolution of settlement building and abandonment by ha between VI BC-XX AD



Fig 10 - Chach-Keles: Map of occupied settlements during the VI AD. Legend as Fig 5.1

In the *Talas* valley the urban complex starts during the VI-VIII AD with just 6 large structures, of which 3 (one for each of the three mining zones of the valley) are already from the start (or will become soon) the most important metallurgic centers of the valley, and one of them (the heavily fortified Sheldji¹⁷) also a minting town. The rest of the urban complex is quickly built during the X AD under the Karakhanids: it consists of 46 more units of which 7 are additional metallurgic towns averaging more than 4-5 ha. The valley saw also the development of wide hydrological, irrigational and agricultural schemes, evidently in support of the high level of mining activity. In the XIII AD, with the sharp decrease of mining and the Mongol invasion, the occupied urban park changes from 52 units covering 135 ha to just 11 units covering 68 ha. Some mining activity keeps going until the XV AD when the last units, i.e. the 3 earliest metallurgic centers, are also abandoned (Kojemiako, Bubnova 1963). (Fig 11, 12, 13, 14)

¹⁷ Three circles of walls are surrounding the town citadel (a tortkul now submersed by an artificial lake), the external ones enclosing an area of 7x4 km (see Fig. 16).



Fig 11 - Talas valley: evolution of settlement building and abandonment by ha during the IX AD



Fig 12 - Talas valley: Map of occupied settlements during the IX AD. Legend as Fig 5.1



Fig 13 - Talas valley: Map of occupied settlements during the XAD. Legend as Fig 5.1



Fig 14 - Talas valley: satellite image of the medieval town of Sheldji (VI-XV AD). The main tortkul is today under water at the very center of the image, but visible are two ranges of outer-walls, with the external one developing west to east for more than 10 km.

4 - The Mongols and the dismantlement of the NW-Tienshan urban system: military destruction or managerial and monetary incompetence?

The XIII century sees the reduction by 65% of the urban area of the western part of N-Tienshan (Talas, Chu, Semirechie, more or less homogeneously affected) and the reduction by half of the urban area of the Syrdarya (mainly the Chach region). During the following XIV AD the urban situation of the Syrdarya doesn't worsen, but it does it in western N-Tienshan where the urban system, reduced again by half, comes to an end. The reasons of such a quick dismantlement of a huge urban system of more than 2500 ha are probably several concomitant factors.

- The N-Tienshan region is easily favoring a switch to transhumant pastoralism as regulation to an urban socio-economical crisis, particularly during a pluvial phase, which here is clearly established between the XIV and XVIII AD.
- The XII AD itself has not been a period of development. Mining activity ends in Central Asia and switches to Europe; mismanagement and internal conflicts characterize the last decades of the Karakhanid confederation and the Karakitai empire; and a drying climatic phase starts which will endure for around 150 years.
- The travelers moving together with the Mongol army in 1219 and 1221 don't report about town destructions and are instead witnessing a well organized agricultural and urban landscape. But the travelers crossing the region just 30 year later speak about hundreds of abandoned towns in ruin.
- Mongol rulers have surely been very bad administrators, particularly on monetary matters. For example, as soon as they put their hands on Bukhara, in 1232, they imposed the admonitory course (under the threat of death penalty) of an overvalued silver-coated copper drachma, a fact that reintroduced barter transactions and paralyzed every large commercial activity until the 1271 monetary reform by part of the local governor Masud Beg (Davidovich, Dani 1998). They did the same in Iran under Il-khan rule and in China under Kublai-khan at the end of the XIII AD by imposing the circulation of an inflationary excess of paper money, which paralyzed transactions and provoked popular upraises.



Kufic dirham from Chach (Al-Walid, 713 AD)

BIBLIOGRAPHY

Barthold V (1900) Turkestan down to the Mongolian time. St. Petersburg

Bernstein W. (2008) A splendid exchange. London, Atlantic Books

Blanchard Jan (2001) Mining, metallurgy and minting in the Middle Ages: Vol. 1, Asiatic Supremacy. Stuggard.

- Brøndsted, Johannes (1965). The Vikings. (transl. by Kalle Skov). Penguin Books.
- Bubnova M. (1963) Dobycha cerebro-svizovyx rud v Sheldji v IX-XII vv. In: Archeologichiski pamiedniki Talaskoi doliny, Frunze
- Buryakov Y. (1965) O mestonakhazhdenii serebryannogo rudnika Sasha. Obshchestvennie nauki v Uzbekistane, n. 12

Cowen R. (1999) Medieval silver and gold. In: *Essays on geology, history and people (Exploiting the Earth)*. http://mygeologypage.ucdavis.edu/cowen/~GEL115/index.html

- Cribb J. (2000) Money. London, New York: DK publishing
- Davidovich E., Dani A. (1998) Coinage and monetary system. In: *History of civilizations of Central Asia, vol. 4*, Paris, UNESCO
- Hoven B (1982) Ninth century dirham hoards from Sweeden. Journal of Baltic studies, 13:3
- Ibn Fadlān, Ahmad (934) Voyage chez les Bulgares de la Volga (in French). Ed by: Canard M, Miquel A (1988) Paris, Sindbad
- Ibn Hauqal (977) Surat al-Ard (The face of the Earth). Ed and tr by Ouseley (1800), 268
- Ibn Khordadbeh (870) The Book of Roads and Kingdoms.
- Ibn Rustah (X AD) *Kitāb al-A'lāk an-Nafīsa (Book of precious records)*. Ed by: De Goeje M. J., Bibliotheca Geographorum Arabicorum [BGA], Leiden, E. J. Brill, 1892
- Kojemiako PN (1963) Archeologicheslie pamiatniki Talasskoi dolini (Archaeological monuments of the Talas valley). Frunze
- Korpela Jukka (2008) The world of Ladoga: society, trade, transformation and state building in the Fennoscandian boreal forest zone. LIT, Verlag Munster
- Kovalev RV (2002) Dirham Mint Output of Samanid Samarqand and its Connection to the Beginnings of Trade with Northern Europe (10th century). *Histoire & mesure*, XVII 3/4
- Kovalev R (2003) The mint of Al-Shash: the vehicle for the origins and continuation of trade relations between Vikingage Northern Europe and Samanid Central Asia. *Archivum Eurasiae Medii Aevi 12* (2002-2003), 47-79
- Kovalev R (2011) Circulation of Sāmānid dirhams in Viking-Age Northern and Eastern Europe (Based on the Mints of Samarqand and al-Shāsh). Paper presented at the *Oriental Numismatics Workshop*. *Monetary Circulation in 10th-c*. *Northern Europe*. Oxford University, UK (August 1-2, 2011)
- Kovalev RK, Kaelin AC (2007) Circulation of Arab silver in Medieval Afro-Eurasia: Preliminary Observations. *History* Compass 5
- Martinon-Torres M. & Rehren Th. (2011) Mining, Europe. In: *Encyclopedia of Society and Culture in the Medieval World*. Dallas: Schlager.
- Mas'udi Al (947) The Meadows of Gold, The Abbasids. Transl. Paul Lunde and Caroline Stone, Kegan Paul, London and New York, 1989
- Merkel S et alia (2013) Analysis of slag, ore, and silver from the Tashkent and Samarkand areas: medieval silver production and the coinage of Samanid Central Asia. In: *Metalla Sonderheft 6, Archäometrie und Denkmalpflege*
- Michell R., Forbes N. The Chronicle of Novgorod, 1016-1471
- Nef JU (1987) Mining and Metallurgy in Medieval Civilisation. In: Postan M. M. & Miller E. (eds), *The Cambridge Economic History of Europe, vol. 2: Trade and Industry in the Middle Ages*, 2nd edition. Cambridge: Cambridge University Press, 693-761.
- Noonan TS (2001) The Tenth-Century Trade of Volga Bulgharia with Samanid Central Asia. Archivum Eurasiae Medii Aevi 11 (2000-2001), 167-194
- Rubrouck (of) William (Rockhill edition, 1900) The Journey of William of Rubruck to the Eastern Parts of the World, 1253–55. Hakluyt Society
- www.unc.edu : Ancient road from the Vikings to the Greeks; Coins; Silver.