

Chemical Crafts- Alchemy- The History of the Interaction of Natural Knowledge on the Way to the New Age-Nature Medieval Technochemical Crafts of the 12th-16th Centuries in Europe

Maryte Kuodyte

Independent Scholar, Lithuania

***Corresponding author**

Maryte Kuodyte, Independent scholar, Lithuania.

Received: October 30, 2023; **Accepted:** November 14, 2023; **Published:** November 17, 2023

People have always wanted to know the world around them. People not only got to know the animals, plants, stones, rivers that surround them, but also tried to adapt these objects found in nature to their own needs. In order to meet the evolving needs of people as best possible, people have developed various fields of science.

Already in very old times, they learned to use chemical technological processes, about 4 thousand years ago they learned to melt gold from the gold sands in the African deserts, to make cosmetic ointments, paints, to heat pots or to dye fabrics. And although the 21-st century the living human community learned to make such products that our ancestors may not have thought about, but even today it is interesting for us to find out what people who lived many centuries before us knew, how they made products. Humanity in particular is always interested in things shrouded in mystery and especially in the personalities who created those mysterious things.

Now, in the daily press, we read about extraordinary water or toilet paper manufacturers or fortune tellers who are ready to help us reach the top or the Olympus of power or cure all diseases. As far back as the 12-th century alchemists offer similar things to the rulers of the time: they promised to produce an abundance of gold that would ensure unlimited power, and to create an elixir of eternal youth that would allow them to be in power forever. Today, alchemy seems to some to be some pointless pouring, baking, distillation of smelly and smoky solution by a bearded alchemist, to others – an alchemist gold producer or forger, whose secret might not be bad to know.

For about 500 years, in the palaces of all European rulers, there were either astrologers who wanted the heavenly bodies to help their rulers, or alchemists, who not only called for the help of the heavenly bodies, but also tried to make gold, poison, or elixirs of eternal youth themselves [1].

The article attempts to review the so-called „Mature Middle Ages (XII-XVI)“ vol i.e. The period of development of technochemical crafts, in which it is appropriate to discuss the creators of new

technologies in Lithuania, such as the bell casting workshop in Vilnius in the 14-th century [2] or other technochemical crafts: „Bell casting in Lithuania XIV-XVI centuries“.

The casting of bells and cannons became very common in the period in question. V. Birringučys in the seventh chapter of his book described in great detail the constructions of large and small smelters, as well as some mechanical equipment used for cutting, as well as the constructions of bellows. V. Birringučys book was published many times: in 1550 years in Italian, 1558 – Frech, 1925 years in German, 1945 years in English.

Bell Casting in Lithuania 16-th- 20-th centuries “LOUD AS THE BELL OF THE CYPRESS” (Proverb)

Casting, a technique of applied decorative art, when molten metal-copper, brass, bronze, iron, cast iron, silver, tin, or other materials are poured into special forms and solidified. The mold gives shape to the casting and determines its size.

A bell, a percussive signaling instrument. Empty, cut off the bottom in the shape of the pear hood. Bells come in various sizes – weight from a few grams to 200 tons. Since the 13- th century, they have been decorated with bands of ornaments, figurative heraldic relief compositions, inscriptions, dates, the name of the foundry, the founder or the bell are incorporated into the bells. They are struck with an internally suspended core- with a hammer or with a hammer. The sound of the bells is clear, strong and has many overtones [1].

Already in the III – II millennium BC, copper and brass casting was cultivated in Mesopotamia, Egypt. Bells have been known in Asia since the 9-th century. P. M. e. , they were produced by ancient Egyptians, Assyrians, ancient Greeks, Romans, European and Far Eastern peoples. Large bells began to be cast in the 4-th century. They used to be ribbed, round, the current shape was established in the 13 th - century. Bells were started to be hung in bellfries, they were used to inform residents about meetings, holidays, celebrations, dangers, and announce the time; lighthouse bells showed direction in the dark. From the 6th century bells used by the Christian church [2].



In 1557 year february 28 was bought in 1556 by order of Žygimantas Augustus was buy “De re metallica” – Georg Andreas Agricola (1494-1555) twelve book – „Twelfth book on mining and metalurgy“. It was the first book on the European continent to describe the casting process and the preparation of raw materials for the process in great detail. These book served as essential textbooks until 18-th century; in the fields of geology, mining and metalurgy.

Main article: “De re metallica” - this article tries to look at the bell casters who worked in Vilnius and the works they created [2]. There is no very precise information about the emergence of the art of bell casting in Lithuania.

Historic Teodor Narbutas (1784-1864) mentions this the manuscript of the St. Bernardine monastery in Trakai, which mentions the 1377 year cast bell decorated with the image of the Mather of God. At the bottom of this bell there was an inscription in old Slavic language, in which it seems possible to read that the bell was cast in 6885 year in the Paraskevija Church in Vilnius, there was an inscription in Gothic letters indicating the initials and surname of the caster - K.S. Skobelt. It is believed that the orderers of this bell were Lithuanian Grand Duchy of Lithuania Jogaila together with her mother Julijona. The date of making the bell coincides with the date of date of Grand Duke Algirdas – grand Duchy of Lithuania, who ruled from 1345- 1397 years.

1518-1522 years the legal acts of the Vilnius chapter mention the bells of the castle church in 1582 June 22. The legal acts of the Vilnius chapter mentioned that the „Sunday bell („compagna dominicalis“)broke down and it was decided to recast it. It is written that during the great fire that raged in Vilnius on June 1 1610 years the Vilnius Cathedral burned down „with all the bells, the bells melted like candles“. After the fire Wilhelm Pohl, who led reconstruction works in Vilnius, collected metal scraps from the cathedral bells, which were later used to cast new cathedral bells.

The history of bell casting in Vilnius was describe in great detail by researcher of the history and culture of Žemaitija, archeologist, ethnographer, librarian Mykolas Eustachijus Brenšteinas- Brensztein in Polish, in the outline written him.



Mykolas Eustachijus Brenšteinas - Brensztein (1874-1938)

M. E. Brenšteinas written in Polish 1924 years: „Zarys dziejow ludwisarstwa na ziemiach b. Wielkiego Księstwa Litewskiego“ – „Outline of the the history of casting in the former Grand Duchy of Lithuania“ (Zarys dziejow ludwisarstwa na ziemiach b.W.Ks. Litewskiego).

M.E. Brensztein provided a very detail description of the history of bell casting in the Principality of Lithuania. Polish Historian Mykolas Eustachijus Brenšteinas was born 1874, October 2. in Telšiai, died in Vilnius 1938 March 29 1938 Since 1910 lived in Vilnius, 1919 – 1938 Librarian in Vilnius The University Library, head of the museum of the Vilnius Friends of Science Society. M. Brensztein published about 300 articles about Lithuaniai culture, history, librarianship and bibliography, prepared a book about Lithuaniai science, education, art and other societies (<https://www.vle.lt/straipsnis/mykolas-eustachijus-brensteinas/>).

As M. Brenšteinas [3] wrote, a foundry man from Lorraine, Jonas Breutelis appeared in Vilnius. He worked in the royal foundry. In the same year he produced the first small bell with a diameter 33 cm., height 29 cm, with the inscription „Divino auxilio me fecit Joannes Breutel S.R.M. fusor in 1644 year. Two more bells were in the work shop of Jonas Breutel – one for the Dominican church in the Vilnius district with the inscription „ME FECIT JOANNES BREUTET S.R.M. FUSOR“ and another – for the Lithuania Viduklė church, 95 cm in diameter and 12 cm height. This bell was richly decorated with a baroque-type ornament and cartouche, in which an inscription was incorporated: “ IOANNES BREUTELT ME FECIT ANO“.

Lorraine in 1646 year poured the largest bell made in his workshop- 99 cm in diameter. These bell was intended for the small town Plungė parish church. The founder of this bell was Stanislovas Vaina. The bell was decorated with the coat of arms of Vaina, images of the Mother of God and Saint John, and a cartouche, just like the first bell, indicate 1646 – the year the bell was made.

In 1576 bell was cast for the Calvinist community church in town Kelmė with the inscription: „DIVINAS AUXILIO ME FECIT IOANNES BREUTEL S.R.M. FUSOR FUSA VILNAE 1647“.

Polish historian Michał Eustachius Brenšteinas (1874-1938) said that this was the only record confirming that Breutel worked as a bell vaster in Vilnius. Two more bells cast J. Breutel are known in 1673 a bell with a diameter of 92 cm and a height of 74 cm was cast with the inscription above: Hoc opus perfectum est

lauden et gloriansan (c) tissimae et individuae trinitatis generosus ioannes sudek de Wilczewo skabinus terrestris marienburgensis campanas has noviter pretio suo ut plurimum curavit d, andreas skolski pastor“.

Beneath the inscription were relief images of the twelve apostles on the side planes four: images: Moses, Christ, s Appearance, the Good Shepherd and the Crucified. A Bell under German doctor, year below the images, a cartouche with the founders coat of arms: „TREJETAS“, a cartouche with the caster's surname: “ioannes breutelgos mich anno 1673“ and the year the bell was cast on the surface of the bell.

Another smaller bell, 79 cm in diameter and 65 cm high, also had the inscription: „hoc ppus factum est laudem sanctissime et individuale trinitatis ets. Michael the Archangel“. The bell was decorated with the same four images as the larger bell. Although there is no master name on the bell, historian M. E. Brenstein said that this bell also cast by J. Breutel in 1924, both of these bells were located in East Prussia church in Postolinija.

Polish historian M. E. Brenstein believed that in 1641 year May 28 on the order of Jurgis tiškevičius (1596-1656), the bishop of Žemaitija – one of Lithuanian the bell for St. Kražiai small town – was cast. J. Breutel worked in this church in 1641 years May 28/

According to M.E. Brenstein the bells in Breutel workshop are of very high quality, have beautiful shapes, the bell designs are very expressive and he also had a great sound. M. E. Brenstein indicated that in Vilnius in the same period bell were cast not only by the already mentioned J. Breutel, but also by the bellcaster Caspars Wecher or Wachner, who in 1649 October 20 cast a bell for the very Lithuanian interest town Kėdainiai – Lutheran community church.

“THE MOST FAMOUS VILNIUS BELL AND CANNON FOLDER JON DELAMARS – JOANNES DE LA MARCHE, DELAMARS“ ASVITAS POŠKUS WRITES IN THE BOOK “MISSING ACUPUNCTURE OF THE CITY VILNIUS“. Tytoalba, Vilnius, 2016, V p. 114 [4].

M. E. Brenstein mentions another well-known bellcaster in Vilnius - Jean de Lamarch, although he noted that he could not find out when and from where craftsman came to Vilnius, but judging by the manner of writing the surname, he was a former Frenchman. While living in Vilnius, this master simplified his surname and already in 1656 year began to sign Joannes Delamarsu, in Latin his surname were written I.D., this surname starting in 1662 years already mentioned in all state documents of the city of Vilnius and the bell cast on it. However, M. E. Brenstein and four other bells cast by his master, on which the older variant of the master's surname - joannes Delamars casts a bell of one thousand pounds (a pound is a measure of mass used before the introduction of metric system, equaling 409,50 or 365, 47 grams to the clock of the recently rebuilt Vilnius Town Hall tower. Materials used for casting the bell; a total of 222 grams and 24 grasi, paid by the city of Vilnius. Copper, cast iron, and tin were used to cast this bell. In October of the same year, Mr. Delamars was paid 49 kappas and 12 grasi for his work, while he was pouring 3 pots of honey, which cost 48 grasi. In 1663 Mr. Delamars paid 24 grammes of taxes for his house in Vilnius.

In 2016 years Lithuanian writer V. Poškus wrote in his book “Nedingęs Vilnius Miesto akupunktūros“ [4]. V. Poškus wrote in his book; „The house of probably the most famous Vilnius bell and cannoncaster, Jannes dela March, Delamarshe, Delamars also stood on

Pilies st. 16 on the site of northern (left) side of the house. The master lived here in 1663- 1690. It was famous for its bells. One of them is in my hometown Alytus – St. Ludvik's Church, and even a few of them have survived in Vilnius: Cathedral, St. John, Street. In the bellfries of Peter and Paul churches. House in the 19th century rebuilt, but the authentic cellars remained. The is now a national restaurant, and the vaults resemble the bells of Mr. Delamars. Thah foundry was businesslike. Had a country vodka distillery. We would not be surprised to learn that vodka was also bottled in these cellars. After all, the culture of its consumption changes the least in Vilnius“.

M.E. Brenstein pointed out that Mr. Delamars marked almost all the bells cast in his workshop with an oval cartouche in baroque style with the inscription: „JOANNES DELAMARS ME FECIT“, in 1668 J. Delamars cast two bells in Vilnius St. Peter and St Pauls church clock. The larger bell – 75 cm high and 101 cm in diameter rang for hours, while the smaller bell -33 cm high and 65 cm in diameter rang for hours, while the smaller bell – 33 cm high and 65 cm in diameter rang for quarter of an hour, this bell was. Both of these bells were cast in 1669 July 18 and in 1924 years were still used for the clockwork of this church. Delamars the bells were decorated with excellent ornaments, for the church of the Franciscan monastery in Vilnius. In 1864 years after this church was closed, the bells were transferred to Vilnius Piattica Church, and in 1915 years along with many other church bells was stolen from Lithuania by the Tsarist Russian army, was taken to the depths of the Russian empire. In the same year, another „traveling“ bell was cast for the Dominican church in Papatčiai, Trakai district, began in 1863 years uprising and was transferred to the Orthodox church of Mary Magdalene – Visitation Church in Vilnius and in 1915 years shipped to Russia. The third bell cast in the same year was intended for Kernavė church and remained in the church until 1924. The bell was distinguished from the others by the fact that the casting master had inscribed his name not on the cartouche, but on the top of the bell and with the French ending: IOANNES DELA MARCHE VILNAE“.

1670 year Marshal of Kaunas Žygimantas Skorulskis ordered a bell for the Skaruliai church Kaunas district. It was a bell weighing 2,000 pounds, 73 cm high and 101 cm in diameter, richly decorated with plant, the image of the Mother of God with a baby in her arms, the coat of arms of Z. Skorulski and the cartouche of the casting master. In 1671 year Mr. Delamars cast a three thousand pound bell for the Šiluva church, famous for its miraculous image of the Mother of God. It is interesting that the costs of casting the bell were paid for by the Žemaitija Chapter from the money it claimed from the fees of the Calvinist Church. This bell, together with the other 3 bells melted when in 1892 June 16 bell tower of Šiluva church burned down. In 1896 Dorochinskis cast a new bell from the metal scraps of these bells with the inscription: “ME DI GRATIS FUDIT IOANNES DELAMARCH VILNAE 1671“.

1655-1661 years during the war and fires Vilnius Cathedral lost all its bells in 1671. Delamars cast his first bell for the Vilnius Cathedral. The weight of the bell was 4,720 pounds in 1673. The canon and financier of the Vilnius chapter, priest Kazimieras-Andrius Osovskis, commissioned J. Delamars to cast the second bell for the clock to Vilnius Cathedral. The bell was 60 cm and 107 cm in diameter, decorated with the MOTHER of God, St. Stanislaus and St. With images of Casimir, with an inscription in Latin. This bell in 1672 in November, it was moved to the bell tower and was there only in 1924. J. Delamars in 1680 cast three more bells for the bell tower of the Vilnius Cathedral.

In 1672 the largest bell made in the workshop of Delamars was cast: 86 cm high and 117 cm in diameter. This bell was dedicated to the Unitarian Church of the Holy Trinity and Fathers of the Basilians in Vilnius. The founder of the bell was Jurgis Pawlovičius – mayor of Vilnius. The eyelets for hanging the bell were decorated with mystical angel heads in 1675. Trakai Wayvode Marcijonas Oginskis commissioned J. Delamars to cast a bell for the Bernard church in Trakai, later this bell was donated to Eishishki church where it was seen in 1852 years, but in 1912 years this bell not seen in this church.

In 1676 Mr. Delamars cast three bells, two were intended for the clock of the Camaldulian monastery in Pažaislis, the bottom of six bells had the inscription: “IONNES DELAMARCHE ME FECIT”. The weight of one of the bells for Pažaislis monastery is 88 pounds, the other is 405 pounds. The third bell was dedicated to St. Bernardine Monastery of Vilnius. Michael’s Church, whose founders were Sapiegos. After this church was closed, the bell was moved to the Rasa cemetery chapel.

In 1684 four bells of various sizes also were cast by Mr. Delamars. According to M.E. Brenstein. In 1924 the bell tower of the Vilnius Cathedral was preserved only in 1673. Clock bell cast by Delamars. Other bells disappeared from the belfry in very different ways. For example, as M. E. Brebstein wrote, it is known that the chapter in 1801 March 29 gave one of the cathedral’s bells of the Bernardine churches of Vilnius as payment for the carpentry work done during the renovation of the cathedral.

It is believed that in 1688 the last bell was cast in the workshop of Mr. Delamars. M. E. Brenstein wrote that 32 bells were cast in the workshop of Mr. Delamars in 1515.

21 bells were preserved, 9 bells were preserved in the sanctuaries of the city Vilnius.

M. E. Brenstein wrote that 32 bells were cast in the workshop of J. Delamars in 1915 years. 21 bells were preserved, 9 bells were preserved in the sanctuaries of the city of Vilnius. M. E. Brenstein writes in the already mentioned book „Zarys dziejow liuwiarstwa b. W. Księstwo Litewskim“ mention another bell caster who worked in Vilnius- Fiodoras Fiodorovičius Pervec. F.F. Pervec in 1676 cast two bells for the Church of the Holy Trinity in Basilija, one cast bell miraculously survived without melting in 1706. The fire that reigned in Vilnius. This bell called „Swan“ fell on the windowsill of the house next to the church and remained unfused.

Another well-known foundry man who worked in Vilnius is Benjamin Fingerling, who cast bells for the Trinity Church and the city Telšiai Church in the Antakalnis suburb Vilnius.

1727- 1733 years according to the Vilnius city registration books, foundry man Karolis gotlieb Szpar, who did not belong any guild. Lived in Vilnius. 1730 he poured the bell for the church of Nočia. In 1733 Karolis Gotlib Spar cast two bells – for the All Saints Church in Vilnius, on the bells there is an inscription: „CAROL COTLIEB SPAAR VILNAE“

In 1742 another bell caster can be seen in the sky of Vilnius- Tomas Apanovičius (Hapanovičius or Oppanovičius), who introduced himself as an „artifex liberalis“. In 1742 he cast a brass bell for the Church of Saint Rapolo, which was decorated with the images of Saint Francis Xavier and Archangel Raphael, the height of the bell is 58 cm, the diameter is 76 cm, the name of the caster and the year of casting the bell are written on the bell. The bell still remains in this church. It is known that this craftsman also cast bells for the churches of Dūkštas and Krėva.

Around 1745 the foundryman Gustavas Miorkas (Merk) is mentioned in the taxpayer books of the city of Vilnius. In the workshop of Gustavas Miorkas, 18 bells were cast in the years 1749-1759, eleven of them for the churches of Vilnius and three for the churches of the Holy Spirit, Saint Casimir, Vilnius Cathedral. Missionaries and Saint Nicholas in 1749. The bell cast by Miorko weighed 2.800 pounds, was 100 cm high and 129 cm in diameter, during First World War – 1915 years was taken to the Russian Empire. In addition to this bell, five more bells were cast in G. Miorko workshop in 1915 years were also taken to the districts of the Russian Empire.

1790 Foundryman Jonas Samuelis Wachner, whose surname was spelled variously: Wajner, Wecher, Wehner, Wagner – also worked in Vilnius.

John Samuel Wachner is known to have been born in 1757 in Saxony, later lived in Vilnius, located between Totorių and Vilniaus gates, where his workshop was located. Jonas Samuel Wachner belonged to the evangelical community, lived with his wife Anna Marija, daughter and 3 sons in 1706 July 12. Jonas Samuelis Wachner bought a house near Vilnius Street, moved here with family members and set up a workshop.

In the 1808 plan of the part of the city of Vilnius – the street – in Poland ul. Ludwisarska“ in Lithuania „Liejyklos“ street- the surviving name street even now in 2023.

At least 20 bells are known to have been cast, cast in the workshop of Jon Samuel Wachner. It is believed that the last bell was cast in this workshop in 1811 year. Vilnius evangelical cemetery chapels. On the top of the bell is the inscription: „MICH GOSZ UND VEREHRTE ZU DIESER BERGAEBNISZ KIRCHE ION SAMUEL WAEHNER SENIOR DES „>

KIRCHEN COLLEGIUM U:A:C: ZU WILNA AD: 1811“ This bell in 1915 taken to the Russian Empire. Jonas Samuel Wachner died in Vilnius 1823, March 2, buried in the Evangelical cemetery.

Danielius Wener born in Vilnius 1795, December 15, took over his father’s business.

M.E. Brenstein mentions many bells cast by the second generation bell caster Daniel Wener. Some of them were taken to Russia during the First World War in 1915. Daniel Wener died in 1840, leaving no descendants, while being the mayor of the city of Vilnius. Buried in the Evangelical Cemetery.

In 1856 Boleslaw Wener, the grandson of Jonas Samuel Wachner was already casting bells of Vilnius. This craftsman signed his rain bells as follows: „MAISTER WENER [W] WINLEI“ Boleslaw Wener was the last of the 19th century. A bell caster who worked in Vilnius. According to M.E. Brenstein, the Wener did not contribute to the technology of casting bells, nor to the improvement of their decoration.

The First World War church bells were in danger, in 1915 July 18 an article was published in the Vilnius newspaper „Kurier Litewski“ urging priests to inventory the bells in churches, to describe them in detail, to indicate the inscriptions and images on the bells. It should be noted that not a single priest responded to the newspaper’s appeal did not react. The apostolic administrator of the Vilnius Diocese, priest Kazimieras Michalkevičius, in his secret 1915 July 20 in circular no. 3572. Instructed the spiritual fathers to hide church property, archives, guided by their decisions, only not hide all the jewels in one place. In 1915 July 27 The apostolic administrator of the Vilnius diocese received a telephone message from the Governor of Vilnius informing that starting on July 28 the bells of all Catholic churches will be requisitioned. These works will take place under the direction of the gubernatorial architect, Major General Calvinist churches, in order to make a demonstrative example. It was promised that the bells would be

taken out of Vilnius only temporarily and later returned to the churches, but, understandably, not many people believed in such promises.

In 1915 September 8 early in morning by the order of Major General Cherniavski, catholic churches were surrounded, believers were driven out of them and military engineer Cherniavski himself hung two bells of the St. Georges Church of the priests seminary. At the same time Špakovskis the deputy of Cherniavski the gubernator architect hung the bells of the church of the Holy Spirit as well as four bells from the belfry of the Vilnius Cathedral and all four bells of the Church of Saint John.

The military of Tsarist Russia transported the bells from Vilnius by car, loading them onto special platforms, which were accompanied by crowds of mourners. Priests from churches further away from Vilnius began to remove the bells themselves and hide them- they buried them in churchyards and other places. M.E. Brenstein wrote further away from Vilnius began to remove the bells themselves and hide them- they buried them in churchyards and other places.

M. E. Brenstein wrote that in 1815 total of 48 bells were taken from Vilnius churches: 26 bells were taken from Roman Catholic churches, 17 bells from Orthodox churches and 5 bells from Protestant churches. In 1917 March 6 the people of Vilnius were already shocked by the looting of the Jews- the German military, the 30-ton copper roofing of the Vilnius Cathedral and several more bells were requisitioned. It is believed that the Germans managed to take only 5 bells from Vilnius.

It is interesting to note that, nevertheless, several bells taken to the Russian Empire were returned to Lithuanian churches in 1923 September 7 the bell was returned to the bell tower of the church of Saint Jacob in Vilnius. The bell was cast in 1727. In the workshop of Andreas Diorling in the kingdom of Hungary.

1958-1972 a list of cultural monuments of the Republic of Lithuania was compiled [6].

References

1. Lithuanian Soviet Encyclopedia. 12, Vilnius 1984, 93-94.
2. Maryte Kuodyte (2006) Bell casting in Vilnius in the 16th-20th centuries. Mr.253-262. Development of science and technology in Lithuania. Reports of the 10th scientific conference held in Vilnius on September 20-21, 2006, XIX Scientific Research Center publication. „Technika“ publishing house.
3. Brenstein, M.E. Zarys dziejw ludwisarstwa b.W. Ksienstwa Litewskim (1924) Księgarnia stowarzyszenia nauczycielstwa Polskiego w Vilnius. Wilno.
4. V Poškus (2016) Nedingęs Vilnius, Tytoalba, Vilnius metai L 114.
5. Kurier Litewski „ „, 1915 July 18.
6. List of cultural monuments of the Lithuanian SSR. Vilnius: Lithuanian SSR.

Copyright: ©2023 Maryte Kuodyte. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.