Pierian-Macedonian Pitch. A Brand Name Agricultural Product of Ancient Macedonia

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Introduction

In 2005 at ancient Dion in Pieria, Greece, at the excavation of the "Bridge sector", where most probably the harbor of the ancient city is located, many pot sherds were revealed lined with a sticky, brownish substance. Those sherds were the starting point for the research of this organic residue, which is identified with the Pierian-Macedonian pitch of the literary and epigraphical sources.

Seventeen samples taken from pitch remains originated from the archaeological sites of Pieria of both Hellenistic and Roman period were analyzed[1] by gas-chromatography-mass spectrometry and confirmed their pine origin on the one hand and on the other their production by wood pyrolysis of Pinaceae trees, which were in abundance at the slopes of Mount Olympus, exactly as Theophrastus describes. So, Pieria produced botanical, wood derived pitch.

Mineral pitch, bitumen in Greece is attested in Zakynthos by the literary sources. Bitumen is detected on the floor of the fountain of "Theagenes" at Megara[2] as well as in the ear of a bronze griffin protome[3] from Delphi; they were both considered to originate from the east.

Pix Pierica-Pix Macedonica

Ancient Literary and Epigraphical Sources

Herodotus, in the 5th century BC, was the first, among other ancient Greek and Latin writers, to mention the pitch of Pieria "... τῆς Πιερικῆς πίσσης ...",[4] a brand name product well known in the Greco-Roman world. The unknown writer of Geoponica[5] evaluates it as the second one in quality throughout Greece, while Pliny[6] states it was of premium quality, of great appreciation among Greeks and therefore the first in demand.

In the 4th century BC, Aristotle,[7] Theopompus[8] through Pliny's testimony, and Theophrastus,[9] on the contrary, speak about another brand name pitch, the Macedonian one.

In addition, Polybius[10] testifies the royal pitch donation of Antigonus Doson to the Rhodians one or two years after the devastating earthquake there in 225 BC, which was the biggest known so far tar transportation in the Greco-Roman world. The king of Macedonia donated, among others, 1000 talents[11] of Macedonian pitch and 1000 metres[12] of raw pitch. Therefore, he sent approximately 26 tons of pitch and 39 tons of raw, liquid pitch to the Rhodians.

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The aforementioned ancient sources verify two brand name pitches in Macedonia; the Pierian and Macedonian. The first obviously was produced in Pieria and the other is named with a more general term that of Macedonia. Since Pieria constitutes one of the oldest parts of Macedonia, it is evident that the pitch of Pieria was nothing but the Macedonian pitch itself. Nevertheless, the Pierian pitch remained the oldest and most famous part of the Macedonian.

Archaeological Residues of Pierian-Macedonian Pitch

Many pitched sherds were revealed at the excavation of the "Bridge sector" at ancient Dion, as well as at ancient Roman agora, in the "house of Zosas" and in the "villa of Dionysos" (fig. 1). Plenty of them belong to amphorae.

Pitched sherds of amphorae were containing wine,[13] according to Plutarch,[14] Cato,[15] Collumella,[16] and Geoponica.[17] Two mosaic floors, one in the Roman colony of Julia Vienna, in southern France, and another at ancient Caesarea in Algeria, were depicting the wine vessel pitching process, the "πισσαλοιφῆναι", "κωνῆσαι"[18] of the sources.

The resin yields to wine a characteristic sour, piquant flavor and therefore the resinous wine was addressed to a specific winetasting market group,[19] like the today Greek "retsina", a type of wine processed with resin. Dikaiopolis in Aristophanes[20] "Acharnenses" disliked the resinous wine because he reminds him of pitch and shipbuilding. Pliny too thought that pitched vessels should contain wines strictly for medical purposes. On the contrary, the residents of Euboea drank it a lot.

Fig. 1: Dion. Pitched sherd of wine amphora. "Villa of Dionysus". DM:8095.

Recently, in farmhouses of ancient Macedonia plenty amphorae lined most probably with the famous Pierian-Macedonian pitch of the sources were discovered, containing some kind of resinous wine. In Pieria, pitched amphorae were found at a Hellenistic villa rustica at Komboloi[21] and at a Roman farmhouse at the site Pege Athenas. Another 43 pitched amphorae were unearthed in a winery of the Byzantine period at the site of Louloudies.[22] Pitched amphorae were revealed in a villa rustica of late Classical to Hellenistic times at Asprovalta,[23] as well as, at the Hellenistic site of Petres[24] at Florina; seven more pitched amphorae were unearthed in a rustic villa across Via Egnatia at Hemathia.[25]

Pitch is produced also in Chalcidice, which had a long tradition of pitch production, since the 10th–9th century BC,[26] as it was detected on the outside surface of a krater. An alliance between Amyntas III and the Koinon of Chalcidians in 393 BC confirms it.[27] At the framework of this alliance a trade treaty was concluded. The king of Macedonia granted consent for placing on the market for the next 50 years of the tar produced by the Chalcidian's Koinon. It is evident that the "pitt(ss)a", the pitch of the inscription is identified with the organic substance we trace mainly on potsherds. As Macedonia expanded, especially during the reign of Philipp II, the pitch of Chalcidice obviously became part of the Pierian-Macedonian pitch and was brought both under its name and under the royal control as well.

With Macedonian pitch also a number of Acanthus trade wine amphorae was lined, as a stamped pitched amphora handle of Acanthus, dated in 330 BC, found at Amphipolis, demonstrates. Pitch was detected on another Acanthus amphora[28] revealed among other 90 in a workshop of the city.

Trade Mendean amphorae lined with Macedonian pitch carried the famous Mendean resinous type of wine to busy Mediterranean ports, such as Porticello (end of the 5th century to early 4th century BC)[29] in Italy and in Athens (second half of the 5th century BC),[30] as the archaeological evidence declares. A Mendean amphora filled with pitch was also revealed at the shipwreck of Tektas Burnu.[31]

From the excavation of the "Kelepouris baths" at Dion of the Roman period was unearthed an amphora sherd with a mass of solid pitch attached to its inner side. A piece of pitch was also detected into the base of a pointed amphora found at the "Bridge Sector" of the city.

Plutarch and later Or(e)ibasius talk about pitched wine, "πισσινίτη οἶνος",[32] manufactured by mixing a piece of liquid pitch with wine at the fermentation process. Pliny[33] is aware of the method of sprinkling pitch in the must during the first nine days of fermentation, too.

Resinous kinds of wine were known to Thrace, too. One hundred eighty eight pitched amphorae were found upside down at ancient Zone.[34] Pitch residues have been also reported at various sites of the Greco-Roman world, such as Crete,[35] Cyprus,[36] Asia Minor,[37] North Africa,[38] southern Italy,[39] and France.[40] All the above pitch residues most probably come from different than Macedonia pitch production centers.

Fig. 2: Dion. Pitch lump. Dry pitch for sale. "Bridge Sector". DM 8090.

Many free standing pitch lumps were found at Dion. One of them was intact and weights 680 grams = 1,56 attic mnae (fig. 2).[41] Another one was traced at Hellenistic Petres. It weights 3,5 kilos, which corresponds to 8,027 Attic mnae. According to a diagram found at Caunus of Lycia regulating customs duties, dry pitch and resin are taxed by lumps, by "βώλος". So, the above two intact pitch bars more likely were bought in that form.

In addition to that, carbonized preserved pieces of wood coated with pitch were found at ancient workshops of the Hellenistic period across a road near to nowadays Katerini.[42] Literary and epigraphical evidence mention the coating of the wooden usually exterior parts of the buildings with pitch for protection. Those were the "πιττοκοπηθέντα" woods of the sources.

How the Macedonians Produced Pitch "Πιττοκαυτεῖσθαι"

Macedonians had a unique technique they used par excellence to produce massive amounts of pitch. It is notable that Pliny,[43] Aristophanes[44] and mainly Theophrastus[45] knew that way. Theophrastus[46] in particular, describes with scrutiny how the Macedonians burn the pitch "πιττοκαυτοῦσιν" (fig. 3).

In springs and summers, at the slopes of Mount Olympus, among others, they prepared a threshing floor sloping towards the center, where tree trunks are positioned so as to form a pile, like a conical wood tower, with a periphery of about 100–180 feet (= 46–83 m) and height of 50–60 feet (= 23–28 m). From the center of that tower of woods they formed a corridor ending at an opening with trunks, from where they fired the woods. Before that, they covered the pile with thinner tree branches, so as to restrain a layer of soil to be thrown upon it. After they fired it, they closed the opening, so as to achieve as much as they can an incomplete combustion and to extract top quality

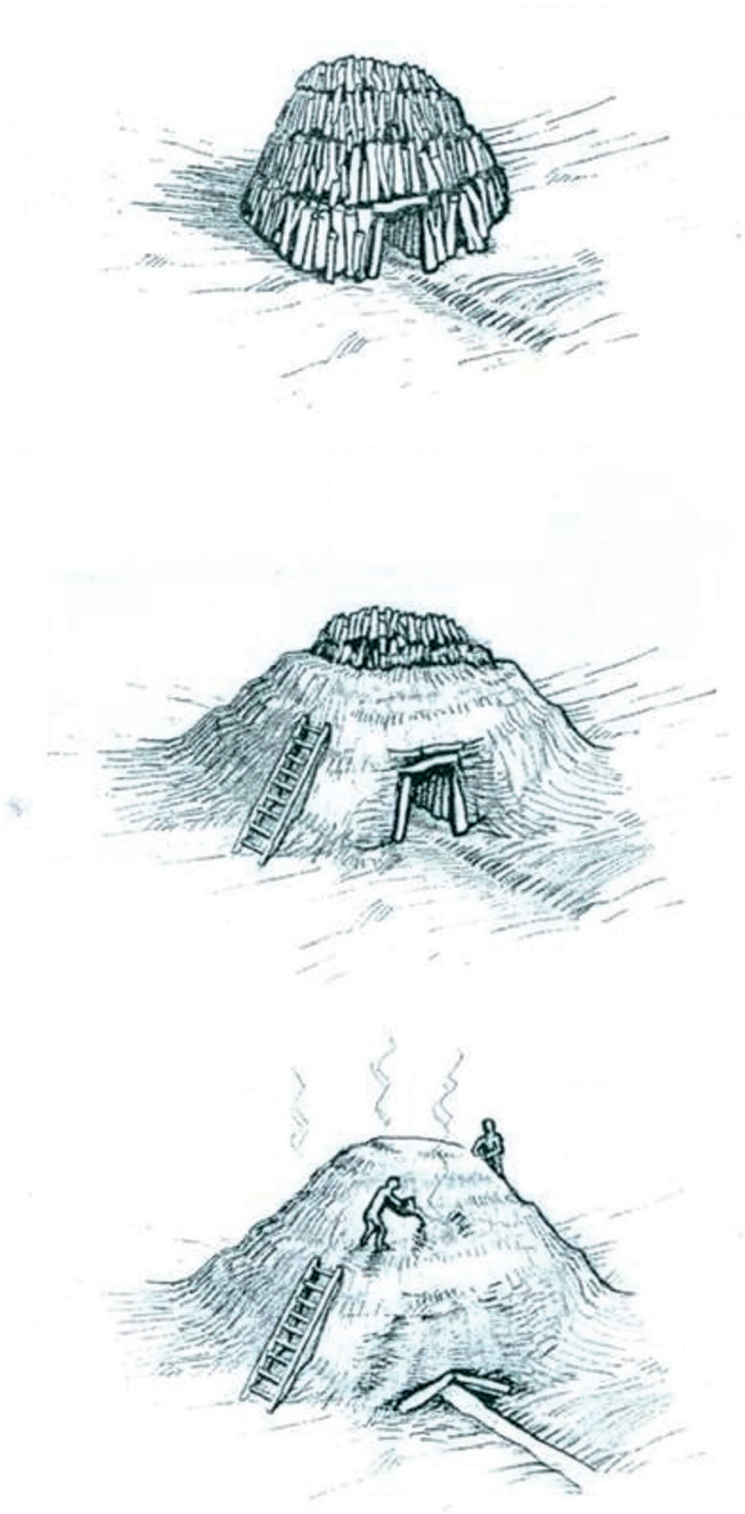

Fig. 3: Reconstruction of the Theophrastean pitch kilns of Macedonians.

Fig. 4: Modern coal kilns in Greece.

tar. This was a pitch kiln. The burning lasted two days, while workers watched it over day and night. During that process, they celebrated sacrificing to their gods, as they used to do with almost all agricultural activities.

Nowadays, in many Greek places, the ancient Macedonian pitch burning technique survived to modern coal kilns (fig. 4). After all, the traditional exploitation of the natural local sources and specifically of the forest goods is a locus communis through centuries.[47]

Archaeological remains of pitch kilns of different types than the Macedonian have been revealed in Bruttium,[48] for the production of another brand name pitch, the pix bruttia. There, the double pot method was used, as in Roman Gaul[49] and in Roman Switzerland[50] too.

Management and Distribution of the Pierian-Macedonian Pitch – a Macedonian Royal Affair

By the alliance of the Macedonians with the community of Chalcidicean towns and the royal donation of tons of Macedonian pitch to the Rhodians is evident, as it was already stated by scholars,[51] that the management of pitch directly associated with the Macedonian king and the income derived from its commercial circulation belonged to the royal revenues (vectigalia regni).

Every year, the priests in Delos, at the time of the annual celebration, bought a large amount of pitch for the coating and glazing of the famous altar, the altar of Horns, "Κερατώνα", as pitch was used to purify[52] it. In 1916, Glotz[53] was the first to support that the pitch of the forty eight Delian inscriptions he studied, was imported from Macedo-

nia, and identified it with the Pierian pitch of the sources, in his attempt to explain the sudden rise of its prize in 279 BC, which, in his opinion, was due to the Gallic invasion of Macedonia that year.

One might also conclude that the pitch used at the port of Piraeus in 377–76 BC, as an inscription[54] mentions, must have been of Macedonian origin, giving the fact that Amyntas had already allied with the Athenians one or two years before, in 375–3 BC. Nevertheless, ancient Macedonia traditionally supplied Athens with shipbuilding wood for the construction of their triremes. That is why pitch was closely linked to fir – shipbuilding wood. After all, pitch and timber were the two main economic resources of ancient Macedonia.

Of Macedonian origin must have been the pitch mentioned on the accounts of the sanctuary of Eleusis in 329–8 BC and in 327–6 BC,[55] as in the same inscription there is a reference to the cutting of Macedonian woods during the second prytany. This strongly suggests commercial affairs between the sanctuary of Eleusis, and Macedonia. The same applies probably for the pitch that was bought in 400–350 BC. at Epidaurus[56] as well as for the pitch used to waterproof the pulley at Delphi[57] harbor, in 361–343 BC.

Mapping (fig. 5) the known natural pitch production centers of the Greco-Roman world and bearing all the above in mind, it is obvious that Macedonians had the absolute supremacy and the monopoly of pitch in Greece, at least during the Classical and Hellenistic era, exactly as Plinius testifies. The literary, archaeological and epigraphical

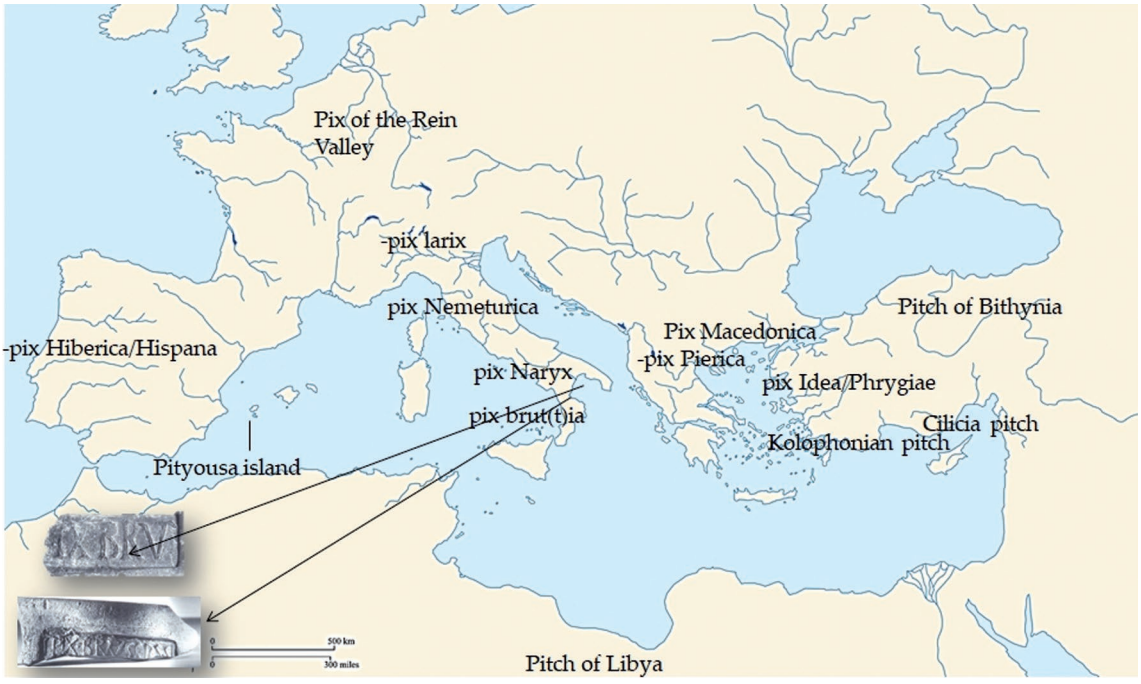

Fig. 5: Mapping pine pitch production centers of the Graeco-Roman world according to literary sources.

evidence allow us to conclude that pitch was produced and traded continuously for about six centuries in Macedonia, from the 5th century BC until the Byzantine era.

In that context, the forested land of Mount Olympus, especially the coniferous zone, is difficult to be considered private land, since someone needed the royal license to exploit the pitch out of trees. So, since the king was the manager of the forest, is plausible to think that on the slopes of Mount Olympus a royal forest was expanded, as well as at Pangeon Mountain, where, in addition to the shipbuilding wood, the royal mines were situated.

It was Philip V[58] who raised the rent of the royal forests, along with other financial measures he took, in order to confront the Roman threat.

The Treaty of Amphipolis, in 167 BC, known as lex aemiliana, regulated the revenues of the royal agricultural goods. According to that, the lease of the royal lands and of the royal forests by contractors (publicani) was forbidden. To avoid riots, the Romans forbade the Macedonians to exploit the former royal agricultural property any longer. The measures of Aemilius Paulus signaled the end of the industrial production and consequently of the wide range trade of the Pierian-Macedonian pitch along with the shipbuilding timber of Mount Olympus, Holomon and especially that of Mount Pangeon. It is not known when the clause of Aemilius Paulus began to apply. Anyway, 158 BC[59] affixed the restart of mining in Macedonia.

Nearly a century later, in 63 BC according to Cicero's[60] speech in Rome, the former royal lands of Macedonia, the lands of Philip V and Perseus, were given by censors to contractors, and they become one of the safest income for Rome.

To summarize, the Pierian, the later Macedonian pitch was not only a brand name product in the "international" tar market of the era but it was a large scale export agricultural good, under the royal control at least from the 5th century BC until the Roman conquest of Macedonia. In that time its management and distribution were closely related to the "state", the royal economy. Pitch was certainly one of the most important economical resources of ancient Macedonia.

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Notes

[1] Vassiliadou 2011, Appendix H., 322. 323; Dimitrakoudi et al. 2011, 581–591.
[2] Vassiliadou 2011, notes 333. 353.
[3] Rolley et al. 2004, 55–65.
[4] Hdt. 4, 195.
[5] Geoponica, 6, 5, 1.
[6] Plin. nat. 14, 128.
[7] Aristot. mir. Auscultationibus, 842b.
[8] Plin. nat. 16, 59.
[9] Theophrastus, Historia Plantarum, 9, 2, 2–3.
[10] Pol. 5, 89, 6–8.
[11] DNP, s.w. Talent = 60 minai. An attic mna weights 436 grams. Consequently, a talent is equal to 26.100 grams. Attic mnae was used in transactions carried out at Dion of Pieria, Pandermalis 1990, 10–15; Pandermalis 1977, 331–342.
[12] Der Kleine Pauly, Lexikon der Antike 2 (1967) 1198. 1199 s.w.: Hohlmaβe (H. Chantraine) 1 metretes = 39,39 liters.
[13] Pitched potsherds did not contain always wine. There have been detected also animal fats or traces of plants or vegetables, like in France: Marshall et al. 2008, 245–254. (2nd–6th cent. AD)
[14] Plut. symp. 5, 676.
[15] Cato agr. 23.
[16] Colum. 12, 18, 3–6.
[17] Geoponica, 6, 4, t.
[18] Μέγα Ετυμολογικό Λεξικό, s.w.: "Κωνῆσαι"; Suda; Hesychius, Lexicon, s.w.: "Κωνῆσαι".
[19] Plin. nat. 14, 120.
[20] Aristoph. Ach. 190.
[21] Poulaki-Pandermali 2001, 331–346; Adam-Veleni et al. 2003, 63–70; Poulaki 2004, 45–56; Poulaki-Pandermali 2008, 137–145.
[22] Marki 2008, 13–15.
[23] Adam-Veleni et al. 2003, cat. no. 272.
[24] Adam-Veleni 1995, 14–23; Adam-Veleni 1996, 1–22.
[25] Koukouvou 1999, 566–578.
[26] Carington-Smith 1991, 335–348.
[27] Tod 1950, 111; Hatzopoulos 1996, Epigraphic Appendix, 1, where all the relevant references can be found.
[28] Trakosopoulou-Salakidou 2004, 157–166, mainly 162. 163.
[29] In the Porticello shipwreck were found Mendean pitched amphorae, with a piece of solid pitch attached to its inner wall. Jones Eiseman, 1973, 2.1, 13–23; Jones Eiseman – Ridgway 1987.
[30] A Mendean pitched amphora was found at the Athenian Agora too; Robinson 1959, 93, fig.35; Koehler 1986, 46. 67, in particular 50–52.
[31] Gibbins 2000, 19. 20; Beck Curt 2001, 248.

[32] Plin. nat. 14, 25, 124, and 23, 45–52; Or(e)ibasius, Medical Collections 5, 25, 36.
[33] Plin. nat. 14, 25, 124 and 23, 45–52.
[34] Tsatsopoulou 1992, 669–675; Tsatsopoulou-Kaloudi 2001, 27. 28, fig. 30.
[35] Markoulaki 2009, 358.
[36] Beck – Borromeo 1990, 51–58.
[37] Gibbins 2000, 19. 20; Beck Curt 2001, 248; Romanos et al. 2009, 900–909.
[38] Bonifay 2004, 461–475.
[39] Costabile 1992, 169–191.
[40] Trintignac 2003, 239–248.
[41] Pandermalis 1977, 331–342; Pandermalis, 1986, 10–15.
[42] For further bibliography Vassiliadou 2011, 39, note 80.
[43] Plin. nat., 23, 46. 47.
[44] Aristoph. Vesp. 1375.
[45] Theophastus, Historia plantarum, 9, 2, 2. 3.
[46] Theophastus, Historia plantarum 9, 3, 1–3.
[47] Gangemi 2006, 455–460. For the resin collection and its manufacture procession specifically in Greece with references to Europe and the USA at the beginning of the 20th century: Damianos 1933.
[48] Cavassa 2008, 99–107.
[49] Orengo et al. 2013, 802–814.
[50] Jauch 1994, 111–119.
[51] Tod 1950, 111; Hatzopoulos 1996, Epigraphic Appendix, 1.
[52] On the use of pitch for the purification of the altars, see: Vassiliadou 2011, 87–96, mainly 93. The purifying qualities of pitch trace back to the prehistoric era. Beckmann 2012, 24–42. For its chthonic dimension in the classical period: Roussel 1934, 177–179.
[53] Glotz 1916, 281–325. For the references of the ancient sources concerning the resin and pitch production centers of the Greco-Roman world, Vassiliadou 2011, 73–81.
[54] IG II², 1604, 32.
[55] Tsountas 1883, 254–263; Koerte 1896, 234; IG II², 1672.
[56] IG IV² 1, 102, 245, 277.
[57] FdD 5 (3), 19. 55; Meiggs 1982, 467–477.
[58] Hatzopoulos 1996, 430.
[59] Larsen 1949, 73–90.
[60] Cic. leg. agr. 2, 50.

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