

RED SLIP TRACKING IN ANCIENT MEDITERRANEAN: A TECHNOLOGICAL CHARACTERIZATION

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Phoenician Red Slip Ware (RSW) is widespread throughout the Mediterranean during the first half of the 1st millennium BC. Nowadays, joint archaeological and archaeometric investigations make it possible to study the phenomenon in a new light analyzing the ceramic class from the point of view of technology and technological traditions.

Keywords: Red Slip Ware; Iron Age; Phoenician; Mediterranean Sea; archaeometry

1. PHOENICIAN RED SLIP WARE IN ARCHAEOLOGY

Phoenician Red Slip Ware (Ph-RSW) is a specialized ceramic class. It is primarily a tableware, and it is characterized by a distinctive red clayey coating referred to as *engobe* or “slip” in the archaeological literature.¹

Some technological peculiarities such as the applied decorations and the slip itself have led scholars to consider Ph-RSW a class imitating the most precious metal prototypes.² The red color of the slip would imitate the non-oxidized surface of the bronze vases.

The archaeological contexts of discovery are the most varied and numerous: Ph-RSW, in fact, is documented in domestic, funerary, sacred, and public contexts.

Ph-RSW is known in Phoenicia (modern-day Lebanon) from the mid-10th century BC. By the end of the century, it is also well attested in Cyprus and in the whole Levant. The oldest evidence in the Phoenician West dates to the late 9th century BC, and Ph-RSW continues to be documented at least until the 6th century BC.³ The period of maximum diffusion, the so-called “Red Slip Period”, is dated between the second half of the 9th century BC and the beginning of the 7th century BC.⁴

Ph-RSW plays a role of primary importance within Phoenician-Punic studies. Indeed, the chronological and geographical breadth of the attestations, from the Levant to the Atlantic Ocean coasts of Portugal, Spain and Morocco, makes Ph-RSW a common element in all regions of the Mediterranean involved in contacts with Phoenician culture and the thread of the Levantine-Phoenician presence throughout the Mediterranean.

* Paragraphs 1, 2, 3 are by Federico Cappella, paragraphs 4, 5 are by Lucilla Fabrizi.

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¹ Cuomo di Caprio 2007, 306.

² Culican 1968, 283-284.

³ The decrease of Ph-RSW is closely linked to geographical distribution. At Lisbon, for example, it is still found within contexts of the 5th and 4th centuries BC (Sousa 2017, 221).

⁴ Stern 2015, 435-436.

2. RED SLIP WARE IN PHOENICIA AND CYPRUS

The study of Ph-RSW – and more generally the study of Phoenician pottery – in the Central Levant is problematic due to the past and current socio-political background of Lebanon,⁵ roughly corresponding to the ancient Phoenicia. Equally, extensive archaeological investigations are difficult because the modern cities obliterated ancient settlements.

At present, Tyre⁶ and the necropolises of the Southern Phoenicia (Al-Bass,⁷ Achziv,⁸ Rachidieh,⁹ Qraye, Joya, Khirbet Silm and Qasmieh,¹⁰ Khaldé¹¹) are the best contexts to observe the development of Ph-RSW. Data are supplemented by the plentiful documentation from Cyprus that provides a useful element of comparison.¹²

In the Levant, the use of red coating on pottery surfaces has an extremely ancient tradition. It dates to at least the Chalcolithic and it continues in the following periods (Red Slip and Red Burnished Wares).¹³

In Lebanon, the reappearance of Ph-RSW during the Iron Age starts from the mid-10th century BC onwards.¹⁴ In this period finds are still limited, and Bichrome Ware is the common ceramic class.¹⁵ The paste is usually slightly purified, the coating is dark red, and the surfaces are irregularly hand-finished.

The beginning of the 9th century BC marks a moment of transition. By this period, the first and clearly distinguishable Phoenician repertoire of RSW is defined. These changes are already detectable in Strata IX-VIII of Tyre.¹⁶ Concurrently, the spread of Ph-RSW outside Phoenicia is also documented, both in Cyprus where it is well documented within funerary contexts (Early Salamis Horizon)¹⁷ and in other neighboring regions of the Levant.¹⁸

⁵ See for example the outbreak of civil war in April 1975, which was the reason for the interruption of excavations and projects in the region such as those conducted in Tyre and Sarepta.

⁶ On the ceramic finds in Tyre, see: Bikai 1978.

⁷ Aubert 2004a; 2004b; 2010; Núñez Calvo 2004; 2008; 2014; 2015; 2020.

⁸ Prausnitz 1982; Mazar 2001; 2004; Dayagi-Mendels 2002.

⁹ Doumet - Serhal 1982; Doumet-Serhal - Kawkabani 1995.

¹⁰ Chapman 1972.

¹¹ Saidah 1966; 1967; 1971.

¹² On the ceramic finds in Cyprus, see: Bikai 1978; 2003.

¹³ Amiran 1970, 42-46. At Tyre, for example, red slipped pottery is well documented in Early Bronze Age levels: Bikai 1978, 5-6, Strata XXVII-XXI, pls. LVII-LVIII.

¹⁴ Following the periodization proposed by F.J. Núñez Calvo (2020, 438-440, fig. 7). In Tyre, RSW is documented from the Strata XIII-X (Bikai 1978, 57, pl. XXXI:4, 12 (Stratum XII) and pl. XXVI:20 (Stratum X-2).

¹⁵ Bikai 1978, 57, tab. 15. This period corresponds to the late Kouklia Horizon in Cyprus and to the Al-Bass Period I, ending around 925 BC (Núñez Calvo 2020, 438-440, fig. 6).

¹⁶ Bikai 1978, 57, pl. XIX-XX.

¹⁷ Bikai 1987, 52-53.

¹⁸ This phenomenon is well documented by the spread of the trefoil jugs outside Phoenicia. In fact, jugs of this type can be found as far as Lachish (Tufnell 1953, tab. 86, 240) and Tell es-Safi/Gath (Shai - Maeir 2012, 339, pl. 14.3:1), Horbat Rosh Zayit (Gal - Alexandre 2000, fig. III.90:8.), Hazor (Ben-Ami - Sandhaus - Ben-Tor 2012, 470, fig. 5.9:6 and fig. 6.22:9) and Megiddo (Finkelstein - Zimhoni - Kafri 2000, 270, fig. 11.19:12; 288, fig. 11.32:13).

The spread of Ph-RSW is not accidental but is related to the gradual increase of Phoenician influence in this historical period. An echo of this phenomenon can be traced indirectly in the literary sources. In fact, they describe, although in a mythical perspective, the relations between the courts of the great settlements of Galilee and Samaria and the Phoenician cities, especially Tyre.¹⁹ Within a similar dynamic, fast-growing historical context, the Phoenician RSW became one of the main elements shared between the different realities of the Levantine chessboard. From this period Ph-RSW is regularly hand-burnished and the earliest shapes of the Phoenician repertoire are now distinctly recognizable. First and foremost, the trefoiled jugs with inverted pyriform body, high neck and trumpet foot, and the neck-ridge jugs with globular body, inverted conical neck and expanded up-right lip.²⁰

From the late 9th century BC onwards, several changes are documented within the Ph-RSW repertoire. They concern both morphological and technological aspects. The use of hand burnishing is gradually replaced by the wheel burnishing technique, and some finds document a mixed technique.²¹ From a morphological point of view, the “early Phoenician RSW repertoire” begins to evolve and the prototypes of the typical forms of the succeeding centuries are now documented. For example, the trefoiled jugs acquire the characteristic biconical shape²² and the plates develop a distinctive brim.²³

From the early 8th century BC, Ph-RSW experiences the period of greatest popularity and, in addition, a time of huge creativity and craftsmanship, which corresponds to a conspicuous increase in shapes and types. From the mid-century, wheel burnishing is the main surface treatment, while the hand finishing of the surfaces characterizes the so-called Red Slip Fine Wares.²⁴ The coating is usually thick, homogeneously applied and the surfaces are finished extremely finely. Reserved Red Slip (RRS) is the most popular decoration of this period.²⁵

The Phoenician repertoire of the 7th century BC shows countless affinities with that of the previous century with some typological variations among the main morphological classes. However, already by the second half of the century, the evidence for Ph-RSW begins to decline. At this time, a partial loss of technological techniques related to Ph-RSW is documented. Some late 7th century examples in Tyre, in fact, show a washed coating and the hand-smoothed surface treatment.²⁶

The 6th century BC represents the final period of Ph-RSW evidence, but the use of applying red coating to ceramics does not disappear in the Levant. It will find new solutions

¹⁹ On the relationship of the House of Omri with Tyre: 1 King 16:31.

²⁰ About these two jug types and their occurrence in the Levant and Cyprus: Cappella 2022.

²¹ Bikai 1978, 57, tab. 15.

²² These jugs are referred to as “Cypro-Phoenician oinochoai” since their function as a tableware container primarily intended for wine has been hypothesized (Botto 2010; Taloni 2009-2010; 2012).

²³ Núñez Calvo 2017.

²⁴ Kenyon 1957, 157.

²⁵ RRS decoration is documented mainly on open forms on which the red coating is alternated with wide concentric bands on the outer surface and bottom. Sometimes engraved decoration is also documented. This decorative pattern would seem to have been developed imitating the corresponding metal prototypes.

²⁶ Bikai 1978, 57, tab. 15. However, the use of wheel-burnishing does not disappear.

over the following centuries, outside the ceramic repertoire of the Phoenician proper tradition.²⁷

3. RED SLIP WARE IN THE PHOENICIAN WEST

The earliest evidence for the Phoenician RSW in the West (Central-Western Mediterranean) dates in terms of conventional chronology to the second half/end of the 9th century BC, when the ceramic class was already widespread in the Levant and in Cyprus.

RSW will achieve great popularity in the Phoenician West, and it is one of the best documented classes during the archaic periods. Thanks to its wide transversal geographical distribution and to recent finds from Huelva,²⁸ La Rebanadilla,²⁹ Utica,³⁰ Carthage,³¹ Sulky³² and Motya³³ it is now possible to outline the links between the Eastern and Western repertoires, although still preliminarily. At the same time, the study of the local developments of the repertoire of the Phoenician RSW in the different geographical areas and the investigation of the phenomena of interaction and cultural adaptation between the Levantine reality and the indigenous environments are now possible.

The oldest finds from Huelva³⁴ and Utica (Phase 1)³⁵ show close morphological affinities with the repertoire of the Motherland. Imported pottery from the Levant and punctual imitations of oriental models are documented. However, already at an advanced stage of this phase, towards the late 9th century BC, the Phoenician West is involved in a broad phenomenon of craftsmanship experimentation that will provide the basis for the development of the future Phoenician Western culture.³⁶

From this time on, material culture gradually began to diversify, acquiring specificities that marked the beginning of regionalization phenomena that are clearly visible in the following centuries. Plates are an exemplary case of this transition process: in the West, plates develop the characteristic convex-shaped brim, a clearly distinguishable feature compared to the shapes of the Motherland.³⁷ At the same time, products resulting from the union of Levantine tradition and taste (morphological and technological) with autochthonous ones are now firstly documented. The so-called “Sardo-Levantine” amphorae are the most notable example of these hybridization phenomena.³⁸

In the oldest contexts Ph-RSW is employed during specific social occasions related to the consumption of wine and meat. The most representative forms of Phoenician repertoire in these contexts are the trefoiled jugs and the hemispherical bowls. Ph-RSW appears in

²⁷ Some vases find comparison within the repertoire of the Assyrian Palace Ware. About the Palace Ware, see: Hunt 2015.

²⁸ González de Canales Cerisola - Llopart Gómez 2020, with previous bibliography.

²⁹ Sánchez Sánchez-Moreno - Galindo - Juzgado Navarro 2020, with previous bibliography.

³⁰ López Castro *et al.* 2020, with previous bibliography; Ben Jerbania 2020; Jendoubi 2024.

³¹ Docter *et al.* 2005; 2008; Maraoui Telmini - Shön 2020.

³² Unali 2017a; 2017b; Pompianu - Unali 2016; Guirguis - Unali 2016; Guirguis 2019.

³³ Nigro 2013; Nigro - Spagnoli 2017; Spagnoli 2019; 2020; Cappella in this volume (A.5.3.).

³⁴ González de Canales Cerisola - Serrano Pichardo - Llopart Gómez 2004; García Fernández *et al.* 2016.

³⁵ López Castro *et al.* 2016; 2020; Ben Jerbania 2020; Jendoubi 2024.

³⁶ Guirguis 2019, 115.

³⁷ Núñez Calvo 2017.

³⁸ Botto 2011, 40-41; 2015; 2017, 76-77; Bartoloni 2012, 1858-1860; Guirguis 2012, 49-51; Zucca 2017.

association with finds of other traditions (Greek, Sardinian, indigenous) and constitutes together with them the aristocratic banquet pottery set of the Central-Western Mediterranean communities.³⁹

From the early 8th century BC, the occurrence of different shapes and types increases sharply and RSW becomes the most frequent tableware class into Phoenician contexts. The vessels are mainly wheel-burnished, and the surfaces are well finished. Locally made pottery is predominant within the repertoire but imports from the Levant are also well attested.⁴⁰

The mid-8th century BC marks a moment of caesura between Ph-RSW repertoire of the Central Mediterranean and that of the Western Mediterranean and the Atlantic Coast.⁴¹ This phenomenon can be observed at both morphological and decorative spheres.⁴²

In the same period (from the second half of the 8th century BC), several ceramic forms that find no comparison within the Eastern repertoire are documented in the Phoenician West. These are the product resulting by the contacts of the different cultural realities of the Mediterranean. Examples are the skyphoid cups inspired by Greek models (*skyphoi* and *kotylai*)⁴³ or the so-called “à chardon” vases, for which it has been proposed that the morphological model can be traced within the indigenous Iberian repertoire of the late Bronze Age.⁴⁴

To conclude, the 7th century BC marks the final moment in the processes of change and local differentiation between the repertoires of the Phoenician West. Towards the end of the century, the recordings of RSW pottery from the Central Mediterranean undergo a strong contraction and by the following century the regionalization of the repertoire reaches a mature point. Although the use of Ph-RSW does not disappear definitively,⁴⁵ it is replaced more frequently by the red painted decoration. From the middle of the 6th century BC, Red Painted Ware, which can be considered the successor of the Phoenician RSW, is widespread in the central Mediterranean.⁴⁶

The sites of the western Mediterranean record a different trend. RSW, albeit in smaller in quantities, continued to be widely documented even during the 6th century BC and in

³⁹ Cappella 2024.

⁴⁰ See for example the case of the Iberian Peninsula: Giardino in this volume (A.5.5).

⁴¹ Cappella 2024.

⁴² Expanded rim jugs are a clear example. In the Western Mediterranean regions, the coating covers the entire outer surface of the vessel, and the body is usually bell-shaped. Phoenician and Cypriot expanded rim jugs show similar features although they commonly have a carinated shoulder. In the south-central Mediterranean, on the contrary, bichrome decoration (Bichrome style Ware) prevails and the red coating is applied exclusively on the rim and the upper half of the neck (Peserico 1996, 84, 124, 132-138). Although the elaboration of this decorative type is original, the reference model can be found once again in the repertoire of the Phoenician settlements of the Motherland and Cyprus, where jugs with similar red and black paint decoration on the neck and rim are documented as early as the 8th century BC (Cappella 2022).

⁴³ Briese - Docter 1992; 1998; Docter 2014.

⁴⁴ Bartoloni 1996, 89-91; 2003, 170-171.

⁴⁵ A case in point is the region of Sulcis where RSW continued to be used even during the 6th century BC in association with white and black painted decorations: Guirguis 2017, 156.

⁴⁶ Peserico 2002, 13, 19-20; Vegas ed. 2002, 148. This phenomenon can be seen in several of the main Phoenician settlements in this region, such as Carthage (Bechtold 2010, 10, 12-14, figs. 7-8), Sulky (Guirguis 2012, 86) and Motya (Spagnoli 2019, 36-38).

some regions, such as Portugal, Ph-RSW continues to be documented even in the following two centuries.⁴⁷

4. ARCHAOMETRIC INVESTIGATION ON THE EARLIEST PHOENICIAN RSW IN THE WEST

The results of the archaeometric investigation on the Phoenician Red Slip Ware (Ph-RSW) artefacts are presented in the following pages.

The aim of the investigation is to individuate compositional and technological parameters, useful to discriminate among samples of the earliest evidence for the Phoenician RSW in the West from different provenance. These parameters should help to understand if a) Phoenicians exported manufactured artifacts from the territory of origin, in their colonies along the Mediterranean coasts; b) they applied a technological transfer in the colonies; c) they tried to reproduce exclusively the appearance of artifacts manufactured in the territories of origin, starting from different raw materials sources and production techniques.

To obtain the discrimination parameters a selection of samples was collected from three archaeological sites of the Mediterranean: Motya (Sicily-Italy),⁴⁸ Sulky (Sardinia-Italy),⁴⁹ Cádiz (Spain).⁵⁰ The data are useful to reconstruct the compatibility of the raw materials used with the geology features of the archaeological area investigated and the technological level of production.

4.1. *Materials and Methods*

A selection of the Phoenician RSW consisting in forty samples from Motya (11 plates, 4 chalices, 1 neck-ridge jug, 12 carinated bowls, 4 bowls with everted rim, 2 open shapes, 2 *skyphoi* and 4 closed shapes), eight samples from Sulky (1 plate, 3 bowls with rim, 3 hemispherical bowls and 1 carinated bowl) and thirty from Cádiz (21 plates, 3 bowls, 1 bowl with handle, 1 double-bowl and 3 open shapes) have been analysed.

In order to reconstruct the technological background and to identify the nature of the raw materials, the body and decoration have been investigated by a multi-analytical approach.⁵¹

Optical Microscopy (OM) allows to identify the structure of inclusions, porosity and matrix, the nature of the inclusions and preliminary information about the manufacture and the firing environment. The textural results obtained allow to divide the samples in significant petro-fabrics.⁵²

X-ray Powder Diffraction (XRPD) contributes to determine the nature of mineralogical assemblage and the occurrence of newly formed minerals, which give indications on firing conditions and technological level of the production.

⁴⁷ See the case of Lisbon: Sousa 2017, 221.

⁴⁸ Nigro - Spagnoli 2017, 1-124.

⁴⁹ Guirguis 2019.

⁵⁰ Niveau-de-Villedary y Mariñas 2018.

⁵¹ The methodology is fully specified and described in De Vito *et al.* 2014, 202–213.

⁵² Whitbread 1995.

Scanning Electron Microscopy coupled with EDS system (SEM-EDS) is useful to investigate the composition and the microstructure of the matrix of body and decoration and to identify small inclusions and microfossils.⁵³

4.2. Results and Discussions

The forty samples from Motya⁵⁴ are divided into five petro-fabrics, based on the petrographic results, realized by specialized manufacturing methodology. The raw materials result to be an illitic clay with inclusions of quartz, calcite and K-feldspar fragments. Other phases are identified and represent the variability of a natural clay deposits. The selection of clayey material used to produce fabrics A and B is good or very good, instead it was less accurate for fabric C artefacts. The tempering process is testified only in few samples: in fabric D (by coarse grains of clinopyroxene fragments) and in fabric E (by the presence of *chamotte*).⁵⁵

The firing condition was controlled with temperature in the range 750-850°C, under oxidizing atmosphere as indicated by the presence of new enucleated nodules of hematite, few traces of gehlenite, and the persistence of calcite and illite.⁵⁶ The comparison of the mineralogical and chemical composition of local clay deposits with that of the ceramic products and differences in the manufacture allowed to distinguishing local (the fabrics A and B, counting 36 samples) from probably imported vessels (the fabrics C, D and E, counting 4 samples). The red slip consists of clay-rich coating. Three different typologies of slips have been identified: Type 1 (purified raw material with few inclusions); Type 2 (very purified raw material); Type 3 (same material used for the ceramic body). Iron compounds were added in Type 1 and 2 slips to enhance the red colour.⁵⁷

However, despite few differences among the compositions and textural features have been reported, the level of technology reached is similar in each petro-fabric production.

The eight samples from Sulky⁵⁸ are divided in one main fabric (with seven samples) and one loner sample.⁵⁹ The selection of clays was poor. The inclusions are dominated by quartz fragments with common fragments of quartz-trachytic rocks, plagioclase and K-feldspar. The body and the slip are made by similar Ca-poor raw materials. The co-occurrence of hematite and magnetite indicate a partial control of the firing process, with a prevalence of oxidizing atmosphere stage, alternated by short stages of reducing atmosphere. The partial decomposition of illite and the presence of new-formed hematite testify, in Ca-poor ceramics,⁶⁰ firing temperature in the range 800 - 900°C.

⁵³ Tite - Maniatis 1975.

⁵⁴ A detailed description of the results on the archaeometric investigation on RSW of Motya can be found in Fabrizi *et al.* 2020b; Fabrizi *et al.* 2020c.

⁵⁵ Quinn 2013.

⁵⁶ Khalfaoui - Hajjaji 2009.

⁵⁷ Detailed figures of the slips are reported in Fabrizi *et al.* 2020c, 1643, fig. 3.

⁵⁸ A detailed description of the results on the archaeometric investigation on RSW of Sulky can be found in Fabrizi *et al.* 2020a and Fabrizi *et al.* 2020b.

⁵⁹ Fabrizi *et al.* 2020a, 105795, fig. 3.

⁶⁰ Aras 2004.

The XRPD data highlighted the association of quartz, cristobalite and tridymite in the main fabric. This mineralogical assemblage is also documented in the ignimbrites of the volcanic district of Sulcis in Sardinia.⁶¹ The absence of tridymite in the loner suggest the use of an alternative source of clayey materials for this sample.

Finally, the slip was applied on an unrefined surface of the vessels and is enriched in hematite in all the samples.

Overall, this production, compared with the production of RSW from Motya, appears less sophisticated and with a moderate level of technological background involved.

The thirty samples from Cádiz⁶² come from two Phoenician archaeological sites, one of the 8th century BC (Cánovas del Castillo) and the other from the 6th century BC (the Necropolis). The samples are divided in two fabrics (unimodal and bimodal) moreover a loner sample has been identified.⁶³ The selection of raw materials is good in each fabric. The bimodal distribution of the inclusions' dimensions in the bimodal fabric, could be due to tempering process.

In the main fabric, the dominant inclusions are quartz fragments associated with common carbonate sedimentary rocks and few feldspars and calcite crystals fragments. In the ceramic paste there are iron nodules with a framboidal microstructures. In the loner sample these structures are absent and carbonate rocks inclusions prevail on quartz fragments.

Microfossils of marine origin are very common in all samples: benthic organisms' domain in the unimodal and bimodal fabrics, while in the loner almost only planktonic specimens occur.⁶⁴

The analysis permits to identify the use of Ca-rich illitic clay, fired in the range of 750-850°C.⁶⁵ The microfossils content, the presence of framboidal iron oxides⁶⁶ and monazite⁶⁷ are compatible with the sedimentary rocks of the area of the gulf of Cádiz. Only the loner sample, made with totally different raw materials, has probably a foreign origin.

As mentioned above, also in the samples from Cádiz the slip was produced using the same clay of the body. The clay used consisted of iron compounds and underwent considerable purification.⁶⁸

5. CONCLUSIONS

No correlation between the archaeological shapes and the ceramic's pastes has been highlighted. Despite few differences in the refinement of the manufacture process and control of the firing environment, the level of technology involved is almost the same in the several productions analysed.

⁶¹ Pioli - Rosi 2005.

⁶² A detailed description of the results on the archaeometric investigation on RSW from Cádiz can be found in Fabrizi *et al.* 2020b e Fabrizi *et al.* 2022.

⁶³ Fabrizi *et al.* 2022, 107054, fig. 3.

⁶⁴ An accurate micropaleontological descriptions of marine microfossils is provided in Fabrizi *et al.* 2022.

⁶⁵ Rathossi - Pontikes 2010a; 2010b.

⁶⁶ These structures are testified in the sediments of the Gulf of Cádiz: Díaz-del-Río *et al.* 2003.

⁶⁷ Monazite occurs in the sediments of Andalusite region (Spain). Fernández-Caliani *et al.* 2009.

⁶⁸ Detailed figures of the slips are reported in Fabrizi *et al.* 2022, 107054, fig. 5.

The slip is made of clayey material, in most cases enriched in iron compounds, the application procedures are finished according to the production context.

In light of all the compositional and technological parameters considered, as identified by the correlation of the analytical data collected during the archaeometric investigation of the sherds, it is possible to hypothesize that the Phoenicians preferred to produce RSW on site, handing down the technological knowledge in the colonies, using local raw materials. Furthermore, by assessing the geological features of the areas in where the archaeological site is situated, it seems possible to recognize the principal production of different RSW manufactories. Few probably imported vessels have been identified.

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