

METALLURGICAL TRADITIONS IN BRONZE AND EARLY IRON AGE MEDITERRANEAN

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The exchange of different kind of metals, technology, skills and types from one side of the Mediterranean to the other is attested since the 3rd millennium BC. Ideas, skills, and technologies moved together with rough materials and smiths aboard of the merchant ships, according to the fashion and the trend of the time, creating at the mid of the Late Bronze Age the so-called metallurgical koinè. The orientation of the flow was mainly from East towards West, but it was not unidirectional.

Keywords: metallurgical *koinè*; itinerant smiths; Mediterranean trade; technological skills; copper

1. PATHS OF METAL TRADE AND TECHNOLOGICAL EXCHANGE

The circulation of metals, related technology, and derived artifacts between East and West of the Mediterranean, across the great islands, namely Cyprus, Crete, and Sardinia, marked numerous trade routes and was the trigger for economies during the Bronze and Iron Ages. International trade, and more specifically commerce of metal developed during the 2nd millennium BC¹ has its premises already in the 3rd millennium BC, as suggested by the hoard from Pella² or by European copper torques found in the Eastern Mediterranean,³ becoming a proper mercantile system only in the Late Bronze Age.⁴

Late Bronze Age (1600-1200 BC) metallurgy is characterized in Anatolia, Levant and in the Eastern Mediterranean by a change in the use of minerals, from local sources towards an extended exploitation of Mediterranean sources in a wider trade network.⁵

As already stated by Massimo Pallottino in 1950,⁶ the power of the Mediterranean Bronze Age culture favored the introduction and diffusion of new shapes, features, and new technologies, and the creation of what has been defined as “metallurgical *koinè*”.⁷ The *koinè* in Mediterranean metalworking traditions is shown by wide distribution of distinguished metal artifacts between the 14th and 10th century BC from central Europe to the Levantine coasts, and vice versa, up to the Iberian Peninsula and the Black Sea and beyond, sharing not just artifacts but also material resources (§ 2.) and technology (§ 3.; fig. 1).

The circulation of metals took place mainly by sea, as testified by the shipwrecks off the Carmel coast (Kefar Samir, Neve Yam, Hishulei Carmel), dating back to 14th-13th century BC,⁸ by those off the southern coast of Turkey, namely Antalya-Kumluca,⁹ dated to 16th-15th

¹ Sherrat - Sherrat 1991, 351; Tusa 2000; 2018, 95-96; Kassianidou - Knapp 2005, 217; Marazzi 2016.

² Philip *et al.* 2003.

³ Broodbank 2015, 431.

⁴ Lambrou-Phillipson 1990; Cline 1994; Katz 2008, 128.

⁵ Sherrat - Sherrat 1991; Knapp - Cherry 1994; Philip *et al.* 2003, 93.

⁶ Pallottino 1950.

⁷ Carancini - Peroni 1997; Sherrat 2000, 85; Jung 2009; Vagnetti 2010, 897-898; Borgna 2013.

⁸ Yahalom-Mack *et al.* 2014.

⁹ Öniz 2019.

century BC, Uluburun,¹⁰ of late 14th century BC, and Cape Gelidonya,¹¹ of late 13th century BC.

Several paths did exist, as shown by peculiar weapons discovered in the Uluburun shipwreck, such as the sword of Pertosa-Thapsos Type.¹² The latter represents one of the earliest Western artifacts found in the Eastern Mediterranean,¹³ probably an import from the Central Mediterranean, like the socketed spearheads from the same shipwreck, which find contemporary comparisons in the Balkan area, in northern Greece and in Italy.¹⁴ However, the lead isotope analyses of some of these items have shown that the copper used comes from Cyprus,¹⁵ revealing a complex system of extraction, exchange, manufacturing, and commerce across the Middle Sea. Indeed, the distribution of Pertosa-type daggers and swords can also illustrate the routes of the diffusion of bronzes belonging to the *koinè*, from Italy across the Adriatic to southern Greece and Crete, up to Cyprus.

The orientation of the flow was mainly from East towards West, but it was not unidirectional. The West-East commercial stream is profiled, for example, by the presence of Nuragic and Sardinian pottery in Crete¹⁶ and Cyprus,¹⁷ by a Thapsos/Milazzese juglet in Beirut,¹⁸ and by the case of the two-looped socketed axe from Motya, an Iberian type of possible Sardinian manufacture.¹⁹

At some point during the 12th century BC, the copper exchange net in Central Mediterranean changed its connotation and directions. At the turn of the century noteworthy changes in the international trade network took place.²⁰ Sardinia is interested by the import of Iberian artifacts and the diffusion of Iberian-like manufactures, specially originated on the Atlantic coast.²¹ Something changed also in Atlantic Iberia. Suddenly there were copious indications of Atlantic metalwork and metalworking influence, as well as numerous hoards with common echoes from Northern France and Britain to Southern Spain. However, connections were not only with the North and the Atlantic world. Atlantic elements were mixed with eastern material coming from the Central Mediterranean and beyond, the early Phoenician presence changed the regional networks of metal production, trade and consumption.²²

The nature of ‘convertible’ value of metals stimulated and favored technological experimentation, intensification of production and increasing of long-distance trade in the 2nd millennium BC.²³

¹⁰ Pulak 1988; 1998; 2001.

¹¹ Bass 1967; Muhly - Stech Wheeler - Maddin 1977.

¹² Pulak 2005, 86, fig. 41; Bettelli 2006, 242, note 2.

¹³ Vagnetti - Lo Schiavo 1989, 222-224.

¹⁴ Jung 2005, 133.

¹⁵ Gale - Stos-Gale 2005, 128.

¹⁶ Watrous 1989; Watrous - Day - Jones 1998.

¹⁷ Bretschneider *et al.* 2018 Bürge - Fisher 2019.

¹⁸ Badre 1998, 76-77, fig. 4 a-b.

¹⁹ Nigro *et al.* 2020.

²⁰ Sabatini 2016, 40.

²¹ Lo Schiavo 2008, 428; Matta - Vankilde 2023.

²² Burgess - O'Connor 2008; Aubet 2008; Armada - Martín-Torres 2016.

²³ Sherratt 2000, 83; Kassianidou - Knapp 2005, 239.

Therefore, between the Bronze and Iron Ages, not only raw materials traveled in the Mediterranean Sea, but also goods, people, knowledge, technological skills, and cultural traditions.

2. METALS SPREAD ACROSS MEDITERRANEAN BETWEEN BRONZE AND IRON AGES

The leading metal of the Bronze Age is undoubtedly copper, sometimes present in alloys and in associations with other metals such as arsenic and tin. Copper in this period is used for the manufacture of luxury items, cult and funerary equipment, personal ornaments, but also weapons and tools.

Iron makes its appearance on the scene only in the first centuries of the Iron Age and copper continues to have a wide use even in this period.

Gold and silver are the precious metals for jewelry and hoards, and silver appears to be the referring value in the pre-coinage periods on either side of Mediterranean.

2.1. *Copper*

Major copper ore districts in the Near East are in Anatolia,²⁴ along the Inner and Outer Taurid Mountain in southeastern Turkey,²⁵ in the Wadi Arabah and Sinai Peninsula (Timna), and in Cyprus.²⁶ The discovery and the adoption of metallurgy of copper in these areas dates back to the 5th-4th millennium BC.²⁷

There was a break in copper production in Wadi Arabah during Middle and Late Bronze Age, when Cyprus had a sort of monopoly of metallurgy of copper in the Eastern Mediterranean, and just with the beginning of the Iron Age a revival occurred in the region.²⁸

During the 2nd millennium BC,²⁹ due to the development of the technology for smelting sulphite ores,³⁰ the overflow in the Mediterranean market of copper and ingots of Cypriot origin, testifies to the leading role assumed by Cyprus in copper production and its related trading activities.

However, at the beginning of the Iron Age Cyprus ceased to be the primary copper supply in the Mediterranean.³¹

The copper is exploited in the Aegean region since the Early Bronze Age.³²

In Italy important copper deposits exist in Sardinia and Tuscany,³³ where the earliest metalworking was performed,³⁴ but copper smelting and working were developed and intensified starting from the 3rd millennium BC.³⁵

²⁴ Pernicka 2014.

²⁵ Hauptmann 2007, 60-62.

²⁶ Hauptmann 2007, 60.

²⁷ Levy 2007; Knapp 2012, 14; Mehofer 2014.

²⁸ Levy 2007, 89.

²⁹ Knapp 1989; 1990; Muhly 1989; 1991.

³⁰ Giardino 2000, 57; Papasavvas - Kassianidou 2015, 130.

³¹ Kassianidou 2001, 99; Meyer - Knapp 2021.

³² Gale *et al.* 1985, 82; Gale - Stos Gale 1992; Bassiakos - Philaniotou-Hadjianastasiou 2007.

³³ Tylecote 1992, 27.

³⁴ Dolfini 2013; Dolfini - Angelini - Artioli 2020.

³⁵ Lo Schiavo 1988; Webster 1996, 136.

The metal ore working started in the Iberian Peninsula already during the 5th millennium BC³⁶ and the copper metallurgy advanced since the 3rd millennium BC.³⁷

The metallurgy of copper arose and developed in the Mediterranean from the 4th millennium BC, favored by the numerous sources of supply spread in the regions from East to West. From the 2nd millennium BC there is a sharing of raw materials, copper products, and technology along conformed routes.

2.2. Iron

Iron, even if geographically widespread, was accidentally produced in the Near East during the 3rd and 2nd millennium BC, mainly as a byproduct of copper metallurgy.³⁸ Until the end of the Bronze Age it was considered more a precious good than an alternative material to copper.³⁹ Since the 12th century BC the metallurgy of iron developed thanks to the circulation of the so-called 'utilitarian' objects,⁴⁰ starting from Cyprus, followed by the Levant.⁴¹ Tuscany was rich in iron as well, but the iron working started only during the first centuries of the 1st millennium BC.⁴²

Levant and Cyprus seem to be places of experimentation and processing of ironworking,⁴³ even if its earlier development might have previously taken place in Anatolia.⁴⁴

Phoenician maritime trade is responsible for the spread of iron technology across the Mediterranean. Thanks to the eastern seafaring iron working and habit were introduced in Sardinia,⁴⁵ and Iberia,⁴⁶ fencing the use of copper and bronze in the ritual realm.⁴⁷

2.3. Silver

Silver has played an important role in the economy of the pre-coinage Eastern Mediterranean as a standard of payment and a reference value since the 3rd millennium BC.⁴⁸ During the Middle Bronze Age silver reached the Levant from Anatolia and the Aegean and it was used as a mean of currency.⁴⁹ At the turn of the 1st millennium BC Sardinian (Iglesiente) silver started to appear in the Levant but was soon replaced by that of Iberian origin (Pyrite Belt).

The Iberian Peninsula played a decisive role in the silver production since the beginning of the 1st millennium BC. The development and the improvement of the noble metal production seem to be related to the arrival of Phoenician sea-traders (and of itinerant smiths) from the Eastern Mediterranean. In fact, in Iberian Peninsula the floruit of silver exploitation,

³⁶ Giumlia-Mair 2015.

³⁷ Montero-Ruiz 1993; Montero Ruiz - Murillo-Barroso - Ruiz-Taboada 2021.

³⁸ Erb-Satullo 2019, 584-585.

³⁹ Snodgrass 1980, 336-337; Sherrat 1993, 64; Pickles - Peltenburg 1998.

⁴⁰ Snodgrass 1980; 1982.

⁴¹ Sherrat 1993, 69-70, 85.

⁴² Corretti - Benvenuti 2001.

⁴³ Snodgrass 1980, 338.

⁴⁴ Erb-Satullo 2019, 567.

⁴⁵ Vagnetti - Lo Schiavo 1989, 227; Lo Schiavo 2013, 122.

⁴⁶ Aubet 2008.

⁴⁷ Lo Schiavo 2008, 433.

⁴⁸ Peyronel 2010, 925.

⁴⁹ Gale - Stos-Gale 1981; Kletter 2003; Broodbank 2015, 376; Eshel *et al.* 2018; 2019, 6011.

both in the indigenous and Phoenician sites, can be set between the end of the 9th-beginning of the 8th century BC and the first half of the 6th century BC.⁵⁰ A new cycle in the metallurgy of silver, characterized by the supply of complex silver minerals and the use of cupellation, by the means of external Pb added to the Ag-rich jarosites,⁵¹ begun with Phoenicians in Iberia.⁵²

Therefore, similar exploitation methods were used in Anatolia and Sardinia starting from the 10th century BC. Accordingly, they were at first learned in Anatolia and then transmitted to the rest of Mediterranean by the enterprises in search of the noble metal.⁵³

3. TECHNOLOGICAL SKILLS SHARED IN THE MEDITERRANEAN

Metallurgical technology, skills and innovations traveled across the Mediterranean with artifacts, on cargo vessels, as the diffusion of iron and silver working illustrates, thanks to the presence of itinerant smiths who brought tools and knowledge with them.

This phenomenon is crystallized in the Cape Gelidonya wreck where the cargo included all the tools of a bronze smith and stone implements as well. Clay moulds are the only missing complements, probably lost at sea. In that way the smiths could operate both on board, for small finishing touches, and in each stop of the sea-route with impromptu furnaces or in already set workshops.⁵⁴

The privileged relationship between Cyprus and Sardinia originates a real transfer of technological knowledge and types between 13th and 12th century BC by the means of which the lost-wax technique, characteristic stone hammers, fire tongs, mirrors, tripods and double axes start to spread over in the Tyrrhenian island.⁵⁵

Contacts and exchange of technology and traditions between the Aegean and Southern Italy also existed during the last centuries of the 2nd millennium BC. They witness a flow from West to East, as shown by the recovery of some stone moulds for winged axes in Crete⁵⁶ and Mycenae,⁵⁷ and a counter-flow from East to West, testified by the diffusion of the sheet bronze-working technique of Aegean tradition in Southern Italy related to the presence of itinerant smiths.⁵⁸

⁵⁰ Eshel *et al.* 2022a.

⁵¹ Eshel *et al.* 2022b.

⁵² Renzi - Rovira-Llorens - Montero Ruiz 2012.

⁵³ Eshel *et al.* 2021.

⁵⁴ Bass 1967, 163; Artzy 2000, 28.

⁵⁵ Lo Schiavo 1982, 291-297; 2003, 158-159; Lo Schiavo - Macnamara - Vagnetti 1985, 22-26; Vagnetti - Lo Schiavo 1989, 277-279; Botto 2017, 487; Russel - Knapp 2017.

⁵⁶ Borgna 2013, 129-131.

⁵⁷ Cazzella 2010, 73.

⁵⁸ Cazzella 2010, 73; Borgna 2011, 294; 2013, 141.

4. OXHIDE INGOTS

Oxhide ingots are a hallmark of Mediterranean metallurgical tradition between 2nd and 1st millennium BC (fig. 2). They can provide numerous information about the Late Bronze Age network of exchanges of goods and technology in the Mediterranean.⁵⁹ Moreover, they were found in utilitarian as much non-utilitarian contexts, and could represent a shared standard for value and exchange in the Mediterranean.⁶⁰

At the end of the Middle Bronze Age and the beginning of the Late Bronze Age oxhide ingots largely circulated in the Eastern Mediterranean, including Crete, and the raw copper seemed to have multiple sources.⁶¹

During the second part of the Late Bronze Age (1400-1200 BC) the Cypriot copper became the primary source for oxhide ingots,⁶² and they, together with plain ingots, spread over the Central-Western Mediterranean, namely Sicily and Sardinia.⁶³

During the Iron Age I (1200/1190-960 BC) the distribution of copper oxhide ingots concentrated in the central part of the Western Mediterranean, that is Sardinia,⁶⁴ but sporadic attestations from the Levant show the persistence of the phenomenon all over.⁶⁵ The primary source seems to continue to be the Cypriot copper, however recent discoveries in North-Eastern Corsica and in Southern France suggest a Sardinian mediation,⁶⁶ if not a Sardinian production at least in the latter case.⁶⁷

Copper oxhide ingots were still significant in Central-Western Mediterranean⁶⁸ at the beginning of the Iron Age, but in the 11th century BC their production in Cyprus was disrupted.⁶⁹ In the same phase there was a revival of Levantine copper mines of Faynan and Timna,⁷⁰ where a fragmentary clay mould for oxhide ingot dating back to the 11th century BC was recovered, in Timna-Site 30,⁷¹ suggesting a displaced production. Moreover, the spread of loaf-shaped ingots from Faynan is registered in the same century and just briefly before the diffusion of plano-convex ingots, once again starting from Cyprus.⁷²

Oxhide ingots clearly represent the net of Mediterranean metallurgical *koinè* and give information about ore supply basins and the movement of technological innovations, starting from Cyprus in a multidirectional exchange system, reaching the extreme shores of the Middle Sea.

⁵⁹ About this topic see: Lo Schiavo 2020; Sabatini - Lo Schiavo 2020.

⁶⁰ Kassianidou - Knapp 2005, 237-238; Rice Jones 2007; Kaiser 2013.

⁶¹ Graziadio 2014, 8; Sabatini 2016, 19-20, 24.

⁶² Gale 2011, with previous bibliography.

⁶³ Kassianidou - Knapp 2005, 237; Sabatini 2016, 34.

⁶⁴ Stos-Gale *et al.* 1997.

⁶⁵ Begemann *et al.* 2001; Graziadio 2014, 8; Sabatini 2016, 39-40.

⁶⁶ Lo Schiavo 2005; 2009, 411-420.

⁶⁷ Domergue - Rico 2002; Lo Schiavo 2013, 118; 2014, 101.

⁶⁸ Sabatini 2016, 35.

⁶⁹ Kassianidou 2001, 99; 2005, 334; 2021, 119.

⁷⁰ Knauf 1991, 185; 1995, 112-113; Fantalkin - Finkelstein 2006, 24-27; Hauptmann 2007, 153; Ben-Yosef *et al.* 2010.

⁷¹ Ben-Yosef 2012.

⁷² Yahalom-Mack *et al.* 2014, 174-175.

5. CONCLUSIVE REMARKS

Metallurgical traditions between Bronze and Iron Ages are characterized in the Mediterranean by shifting in ore supply districts, dynamic metals distribution, and a constant transfer of technological skills, types and shapes, according, on one side, to political and economic changes, and, on the other one, to demand and fashion.

Cyprus and Sardinia between Late Bronze Age and Iron Age are acting as middlemen in the overseas exchange of technology, metals and models, and the enterprises transported smiths, tools, and know-how from one coast to the other of the Mediterranean, that become the melting-pot of the metallurgical *koinè*. In this wide exchange net between the end of the Late Bronze Age and the beginning of the Iron Age, technology and skills seem to move mainly westward, and types and shapes mainly eastward.

Metallurgical traditions have their roots in the 4th millennium BC and grow in a network of connections and exchanges over two millennia, when Eastern metallurgical experience spreads in the Mediterranean through the figures of the artisans and remains in the collective imagination of the peoples of the Middle Sea. A memory of this is in the Homeric poems⁷³ up to the passage from the 18th book of the Iliad, where the Eastern metallurgy is the protagonist in the description of the manufacture of the Achilles' shield by the smithing god Hephaestus.⁷⁴

REFERENCES

- ARMADA, X-L. - MARTINÓN-TORRES, M.
2016 The ALBIMEH Project – Atlantic Late Bronze Age Metal Hoards Compared: *Archaeology International* 19 (2016), pp. 49-53.
- ARTZY, M.
2000 Cult and Recycling of Metal at the End of the Late Bronze Age: P. ÅSTRÖM - D. SÜRENHAGEN (eds.), *Periplus. Festschrift für Hans-Günter Buchholz zu seinem achtzigsten Geburtstag am 24. Dezember 1999* (Studies in Mediterranean Archaeology CXXVII), Jonsered 2000, pp. 27-31.
- AUBET, M.E.
2008 Political and economic implications of the new Phoenician chronologies: C. SAGONA (ed.), *Beyond the Homeland: Markers in Phoenician Chronology* (Ancient Near Eastern studies - Supplement 28), Leuven 2008, pp. 247-259.
- BADRE, L.
1998 Late Bronze and Iron Age Imported Pottery from the Archaeological Excavations of Urban Beirut: V. KARAGEORGHIS - N.CHR. STAMPOLIDIS (eds.), *Eastern Mediterranean. Cyprus - Dodecanese - Crete 16th-6th cent. B.C.: Proceedings of the International Symposium held at Rethymnon, Crete in May 1997*, Athens 1998, pp. 73-86.
- BASS, G.F.
1967 Cape Gelidonya: a Bronze Age Shipwreck: *Transactions of the American Philosophical Society* 57 (1967), pp. 1-177.

⁷³ Reboreda Morillo 2015.

⁷⁴ D'Acunto 2009.

- BASSIAKOS, Y. - PHILANIOTOU-HADJIANASTASIOU, O.
 2007 Early Copper Production on Kythnos: Archaeological Evidence - Material and Analytical Reconstruction of Metallurgical Processes: P.M. DAY - R.C.P. DOONAN (eds.), *Metallurgy in the Early Bronze Age Aegean* (Sheffield Studies in Aegean Archaeology 7), Sheffield 2007, pp. 19-56.
- BEGEMANN, F. - SCHMITT-STRACKER, S. - PERNICKA, E. - LO SCHIAVO, F.
 2001 Chemical composition and lead isotopy of copper and bronze from Nuragic Sardinia: *European Journal of Archaeology* 4.1 (2001), pp. 43-85.
- BEN-YOSEF, E.
 2012 A unique casting mould from the new excavations at Timna Site 30 (Israel): evidence of western influence?: V. KASSIANIDOU, - G. PAPASAVVAS (eds.), *Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC: A conference in honour of James D. Muhly*, Oxford 2012, pp. 188-196.
- BEN-YOSEF, E. - LEVY, TH.E. - HIGHAM, TH. - NAJJAR, M. - TAUXE, L.
 2010 The beginning of Iron Age copper production in the southern Levant: new evidence from Khirbat al-Jariya, Faynan, Jordan: *Antiquity* 84 (2010), pp. 724-746.
- BETTELLI, M.
 2006 Fogge simili ma non identiche: alcune considerazioni sulle spade tipo Thapsos-Pertosa: *Studi di protostoria in onore di Renato Peroni*, Firenze 2006, pp. 240-245.
- BORGNA, E.
 2011 Metallurgical Production and Long-Distance Interaction: New Evidence from LM III Phaistos: *Creta Antica* 12 (2011), pp. 289-306.
 2013 Di periferia in periferia. Italia, Egeo e Mediterraneo orientale ai tempi della koinè metallurgica: una proposta di lettura diacronica: *Rivista di Scienze Preistoriche* LXIII (2013), pp. 125-153.
- BOTTO, M.
 2017 I bronzi d'uso e figurati: M. GUIRGUIS (a cura di), *La Sardegna fenicia e punica. Storia e materiali* (Corpora delle antichità della Sardegna), Nuoro 2017, pp. 487-498.
- BRETSCHNEIDER, J. - DRIESSEN, J. - KANTA, A. - JUSSERET, S. - JANS, G. - CLAEYS, T. - BOSCHLOOS, V.
 2018 Short report of the 2017 campaign (https://www.academia.edu/36116570/PYLA-KOKKINOKREMOS_Short_report_of_the_2017_campaign - accessed September 2022).
- BROODBANK, C.
 2015 *The Making of the Middle Sea: A History of the Mediterranean from the Beginning to the Emergence of the Classical World*, London 2015.
- BÜRGE, T. - FISCHER, P.M.
 2020 Nuragic Pottery from Hala Sultan Tekke: The Cypriot-Sardinian Connection: *Ägypten und Levante/Egypt and the Levant* XXIX (2019), pp. 231-244.
- BURGESS, C. - O'CONNOR, C.
 2008 Iberia, the Atlantic Bronze Age and the Mediterranean: S. CELESTINO - N. RAFEL - X.-L. ARMADA (eds.), *Contacto cultural entre el Mediterráneo y el Atlántico (siglos XII-VIII a.n.e.) La precolonización a debate* (Escuela Española de Historia y Arqueología en Roma - Serie Arqueológica 11), Madrid 2008, pp. 41-58.
- CARANCINI, G.L. - PERONI, R.
 1997 La koinè metallurgica: M. BERNABÒ BREA - A. CARDARELLI - M. CREMASCHI (a cura di), *Le Terramare. La più antica civiltà padana*, Catalogo della Mostra, Milano 1997, pp. 595-601.
- CAZZELLA, A.
 2010 Attività artigianali nell'Italia sud-orientale nel II millennio a.C.: F. RADINA - G. RECCHIA (a cura di), *Ambra per Agamennone. Indigeni e micenei tra Adriatico, Ionio ed Egeo*, Bari 2010, pp. 73-76.

- CLINE, E.H.
1994 *Sailing the Wine-Dark Sea. International trade and Late Bronze Age Aegean* (British Archaeological Reports International Series 591), Oxford 1994.
- CORRETTI, A. - BENVENUTI, M.
2001 The Origins of Iron Metallurgy in Tuscany, with special reference to “Etruria mineraria”: E. HUYSECOM - M. DESCŒUDRES - D. HARRISON (eds.), *The Origins of Iron Metallurgy: Proceedings of the First International Colloquium on The Archaeology of Africa and the Mediterranean Basin held at The Museum of Natural History in Geneva, 4–7 June, 1999 / Aux origines de la métallurgie du fer : Actes de la 1ère Table ronde internationale d’archéologie L’Afrique et le bassin méditerranéen Muséum d’Histoire Naturelle Genève, 4–7 juin 1999* (Mediterranean Archaeology 14), Sidney 2001, pp. 127-145.
- D’ACUNTO, M.
2009 Efesto e le sue creazioni nel XVIII libro dell’Iliade: *Annali dell’Istituto Universitario Orientale di Napoli, Dipartimento di studi del mondo classico e del Mediterraneo antico antico: sezione filologico-letteraria XXXI* (2009), pp. 1-54.
- DOLFINI, A.
2013 The Emergence of Metallurgy in the Central Mediterranean Region: A New Model: *European Journal of Archaeology* 16/1 (2013), pp. 21-62.
- DOLFINI, A. - ANGELINI, I. - ARTIOLI, G.
2020 Copper to Tuscany – Coals to Newcastle? The dynamics of metalwork exchange in early Italy: *Plosone* 15/1 (2022), e0227259.
- DOMERGUE, C. - RICO, C.
2002 À propos de deux lingots de cuivre antiques trouvés en mer sur la côte languedocienne: L. RIVET - M SCIALLANO (éd.), *Vivre, produire et échanger: reflets méditerranéens, Mélanges offerts à Bernard Liou* (Archéologie et histoire romaine 8), Montagnac 2002, pp. 141-152.
- ERB-SATULLO, N.L.
2019 The Innovation and Adoption of Iron in the Ancient Near East: *Journal of Archaeological Research* 27 (2019), pp. 557-607.
- ESHEL, T. - EREL, Y. - YAHALOM-MACK, N. - TIROSH, O. - GILBOA, A.
2019 Lead isotopes in silver reveal earliest Phoenician quest for metals in the west Mediterranean: *Proceedings of the National Academy of Sciences* 116/13 (2019), pp. 6007-6012.
- ESHEL, T. - EREL, Y. - YAHALOM-MACK, N. - TIROSH, O. - GILBOA, A.
2022a From Iberia to Laurion: Interpreting Changes in Silver Supply to the Levant in the Late Iron Age Based on Lead Isotope Analysis: *Archaeological and Anthropological Sciences* 14:120 (2022), pp. 1-24.
- ESHEL, T. - GILBOA, A. - YAHALOM-MACK, N. - TIROSH, O. - EREL, Y.
2021 Debasement of silver throughout the Late Bronze-Iron Age transition in the Southern Levant: Analytical and cultural implications: *Journal of Archaeological Science* 125 (2021), pp. 1-24.
- ESHEL, T. - TIROSH, O. - YAHALOM-MACK, N. - GILBOA, A. - EREL, Y.
2022b Silver isotopes in silver suggest Phoenician innovation in metal production: *Applied Sciences* 12, 741 (2022), pp. 1-15.
- ESHEL, T. - YAHALOM-MACK, N. - SHALEV, S. - TIROSH, O. - EREL, Y. - GILBOA, A.
2018 Four Iron Age silver hoards from Southern Phoenicia: from bundles to hacksilver: *Bulletin of the American Society of Overseas Research* 379 (2018), pp. 197-228.
- FANTALKIN, A. - FINKELSTEIN, I.
2006 The Sheshonq I Campaign and the 8th Century BCE Earthquake: More on the Archaeology and History of the South in the Iron I–IIA: *Tel Aviv* 33 (2006), pp. 18-42.

- GALE, N.H.
 2011 Copper Oxhide Ingots and Lead Isotope Provenancing: P.P. BETANCOURT - S.C. FERRENCE (eds.), *Metallurgy: Understanding How, Learning why. Studies in Honor of James D. Muhly* (Prehistory Monographs 29), Philadelphia 2011, pp. 213-220.
- GALE, N.H. - PAPASTAMATAKI, H. - STOS-GALE, S. - LEONIE, K.
 1985 Copper Sources and Copper Metallurgy in the Aegean Bronze Age: P. CRADDOCK - M.J. HUGHES (eds.), *Furnaces and Smelting Technology in Antiquity* (British Museum Occasional Paper 48), London 1985, pp. 81-102.
- GALE, S. - STOS-GALE, Z.A.
 1981 Cycladic Lead and Silver Metallurgy: *The Annual of the British School at Athens* 76 (1981), pp. 169-224.
 1992 Lead isotope studies in the Aegean (the British Academy Project): A.M. POLLARD (ed.), *New developments in archaeological science: a joint symposium of the Royal Society and the British Academy* (Proceedings of the British Academy 77), Oxford 1992, pp. 63-108.
 2005 Zur Herkunft der Kupferbarren aus dem Schiffswrack von Uluburun und der spätbronzezeitliche Metallhandel im Mittelmeerraum: Ü. YALÇIN - C. PULAK - R. SLOTTA (Hrsg.), *Das Schiff von Uluburun: Welthandel vor 3000 Jahren : Katalog der Ausstellung des Deutschen Bergbau-Museums Bochum vom 15. Juli 2005 bis 16. Juli 2006* (Veröffentlichungen aus dem Deutschen Bergbau-Museum Bochum 138), Bochum 2005, pp. 117-131.
- GIARDINO, C.
 2000 Sicilian hoards and protohistoric metal trade in the Central West Mediterranean: C.F.E. PARE (ed.), *Metals Make The World Go Round. The Supply. and Circulation of Metals in Bronze Age Europe. Proceedings of a conference held at the University of Birmingham in June 1997*, Oxford 2000, pp. 99-107.
- GIUMLIA-MAIR, A.
 2015 Phoenician Metalwork: Composition and techniques: J. JIMÉNEZ ÁVILA (ed.), *Phoenician Bronzes in Mediterranean* (Bibliotheca Archaeologica Hispana 45), Madrid 2015, pp. 481-516.
- GRAZIADIO, G.
 2014 The oxhide ingots production in the Eastern Mediterranean: *Egitto e Vicino Oriente XXXVII* (2014), pp. 5-25.
- HAUPTMANN, A.
 2007 *The Archaeometallurgy of Copper. Evidence from Faynan, Jordan* (Natural Science in Archaeology), Berlin 2007.
- KAISER, A.
 2013 *Copper Oxhide Ingot Marks: A Database and Comparative Analysis*. MA Thesis Cornell University, 2013.
- KASSIANIDOU, V.
 2001 Cypriot Copper in Sardinia. Yet Another Case of Bringing Coals to Newcastle?: L. BONFANTE - V. KARAGEORGHIS (eds.), *Italy and Cyprus in Antiquity 1500-400 B.C.*, Nicosia 2001, pp. 97-119.
 2005 Cypriot Copper in Sardinia. Yet another case of bringing coals to Newcastle?: F. LO SCHIAVO - A.GIUMLIA-MAIR - U. SANNA - R. VALERA (eds.), *Archaeometallurgy in Sardinia from the origins to the beginning of the Early Iron Age* (Monographies instrumentum 30), Montagnac 2005, pp. 333-342.

- 2021 Oxhide Ingots 2020. New Research: M. PERRA - F. LO SCHIAVO (a cura di), *Contatti culturali della Sardegna Nuragica: la rotta meridionale (Sardegna, Sicilia, Creta, Cipro), Atti del IV Festival della Civiltà Nuragica (Orroli, Cagliari)/Cultural Contacts and Trade: the Southern Route, Proceedings of the Fourth Festival of the Nuragic Civilization (Orroli, Cagliari)*, Cagliari 2021, pp. 109-125.
- KASSIANIDOU, V. - KNAPP, A.B.
2005 Archaeometallurgy in the Mediterranean: The Social Context of Mining, Technology, and Trade: E. BLAKE - A.B. KNAPP (eds.), *The Archaeology of Mediterranean Prehistory*, Padstow 2005, pp. 215-251.
- KATZ, H.
2008 The Ship from Uluburun and the Ship from Tyre: An International Trade Network in the Ancient Near East: *Zeitschrift des Deutschen Palästina-Vereins* 124/2 (2008), pp. 128-142.
- KLETTER, R.
2013 Iron Age hoards of precious metals in Palestine-An ‘underground economy’?: *Levant* 35 (2003), pp. 139-152.
- KNAPP, A.B.
1989 Copper Production and Mediterranean Trade: The View from Cyprus: *Opuscula Atheniensia* 18 (1989), pp. 109-116.
1990 Entrepreneurship, Ethnicity, Exchange: Mediterranean Inter-Island Relations in the Late Bronze Age: *Annual of the British School at Athens* 85 (1990), pp. 115-153.
2012 Metallurgical production and trade on Bronze Age Cyprus: views and variations: V. KASSIANIDOU - G. PAPASAVVAS (eds.), *Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC. A conference in honour of James D. Muhly*, Oxford - Oakville 2012, pp. 14-25.
- KNAPP, A.B. - CHERRY, J.F.
1994 *Provenance Studies and Bronze Age Cyprus: Production, Exchange, and Politico-Economic Change* (Monographs in World Archaeology 21), Madison 1994.
- KNAUF, E.A.
1991 King Solomon’s Copper Supply: E. LIPÍŃSKI (ed.), *Phoenicia and the Bible: proceedings of the Conference held at the University of Leuven on the 15th and 16th of March 1990* (Orientalia Lovaniensia Analecta 44 - Studia Phoenicia 11), Leuven 1991, pp. 167-186.
1995 Edom: The Social and Economic History: D. EDELMAN VIKANDER (ed.), *You Shall Not Abhor an Edomite for He Is Your Brother: Edom and Seir in History and Tradition* (Archaeology and Biblical Studies 3), Atlanta 1995, pp. 93-117.
- JUNG, R.
2005 Aspekte des mykenischen Handels und Produktaustauschs: B. HOREJS - R. JUNG - E. KAISER - B. TERZ’AN (Hrsg.), *Interpretationsraum Bronzezeit, Festschrift Bernhard Hänsel* (Universitätsforschungen zur Prähistorischen Archäologie 121), Bonn 2005, pp. 45-70.
2009 I “bronzi internazionali” ed il loro contesto sociale fra Adriatico, Penisola balcanica e coste levantine: E. BORGNA - P. CÀSSOLA GUIDA (eds.), *From the Aegean to the Adriatic: Social Organisations, Modes of Exchange and Interaction in Postpalatial Times (12th-11th c. BC), Atti del Seminario internazionale (Udine, 1-2 dicembre 2006)*, Rome 2009, pp. 129-157.
- LAMBROU-PHILLIPSON, C.
1990 *Hellenorientalia. The Near Eastern Presence in the Bronze Age Aegean, ca. 3000 - 1100.B.C. Interconnections based on the material record and the written evidence plus Orientalia: A Catalogue of Egyptian, Mesopotamian, Mitannian, Syro-Palestinian, Cypriot and Asia Minor Objects from the Bronze Age Aegean* (Studies in Mediterranean Archaeology. Pocket Book 95), Goteborg 1990.

LEVY, TH.E.

2007 *Journey to the Copper Age. Archaeology in the Holy Land* (Annual of America School of Oriental Research), San Diego 2007.

LO SCHIAVO, F.

1982 Ambra in Sardegna: in *Studi in onore di Ferrante Rittatore Vonwiller* (Società Archeologica Comense), Como 1982, pp. 257-277.

1988 Early Metallurgy in Sardinia: R. MADDIN (ed.), *The Beginnings of the Use of Metals and Alloys*, Cambridge 1988, pp. 92-103.

2003 Sardinia Between East and West: Interconnections in the Mediterranean: N.CHR. STAMPOLIDIS (ed.), *Sea Routes ... from Sidon to Huelva. Interconnections in the Mediterranean 16th-6th c. BC*, Athens 2003, pp. 152-161.

2005 Oxide Ingots, Cyprus and Sardinia: F. LO SCHIAVO - A. GIUMLIA-MAIR - U. SANNA - R. VALERA (eds.), *Archaeometallurgy in Sardinia from the origins to the beginning of the Early Iron Age* (Monographies instrumentum 30), Montagnac 2008, pp. 305-312.

2008 La metallurgia sarda: relazioni fra Cipro, Italia e la Penisola Iberica. Un modello interpretativo: S. CELESTINO - N. RAFEL - X.-L. ARMADA (eds.), *Contacto cultural entre el Mediterráneo y el Atlántico (siglos XII-VIII a.n.e) La precolonización a debate* (Escuela Española de Historia y Arqueología en Roma - Serie Arqueológica 11), Madrid 2008, pp. 417-436.

2009 The oxhide ingot from Sant'Anastasia, Borgo (Corsica): F. LO SCHIAVO - J. MUHLY - R. MADDIN - A. GIUMLIA-MAIR (eds.), *Oxhide ingots in the central Mediterranean* (Biblioteca di Antichità Ciptote 8, ICEVO-CNR), Roma 2009, pp. 411-420.

2013 Interconnessioni fra Mediterraneo e Atlantico nell'età del bronzo: il punto di vista della Sardegna: M.E. AUBET - P. SUREDA (eds.), *Interacción social y comercio en la antesala del colonialismo. Actas del seminario internacional celebrado en la Universidad Pompeu Fabra el 28 y el 29 marzo del 2012* (Cuadernos de Arqueología Mediterránea 21), Barcelona 2013, pp. 107-134.

2014 La produzione metallurgica: A. MORAVETTI - E. ALBA - L. FODDAI (a cura di), *La Sardegna nuragica. Storia e Materiali* (Corpora delle antichità della Sardegna), Sassari 2014, pp. 93-136.

2020 Sardinia and Cyprus: meeting islands / Sardegna e Cipro: le isole dell'Incontro: M. PERRA - F. LO SCHIAVO (a cura di), *Contatti culturali e scambi commerciali della Sardegna nuragica: la rotta meridionale (Sardegna, Sicilia, Creta, Cipro)*, *Atti del IV Festival della Civiltà Nuragica (Orroli, Cagliari), (12 febbraio 2020)*, Cagliari 2020, pp. 17-23.

LO SCHIAVO, F. - MACNAMARA, E. - VAGNETTI, L.

1985 Late Cypriote Imports to Italy and Their Influence on Local Bronzework: *Papers of the British School at Rome* 53 (1985), pp. 1-71.

MARAZZI, M.

2016 Connessioni transmarine: Vivara e Pantelleria, dinamiche e cronologie dei più antichi contatti con le aree egee e levantine: A. CAZZELLA - A. GUIDI - F. NOMI (a cura di), *Ubi minor... Le isole minori del Mediterraneo centrale dal Neolitico ai primi contatti coloniali, Convegno di Studi in ricordo di Giorgio Buchner, a 100 anni dalla nascita (1914-2014), Anacapri, 27 ottobre - Capri, 28 ottobre - Ischia/Lacco Ameno, 29 ottobre 2014* (Scienze dell'Antichità 22), Roma 2016, pp. 131-147.

MATTA, V. - VANDKILDE, H.

2023 The State of the Debate: Nuragic Metal Trade in the Bronze Age and Early Iron Age: *Open Archaeology* 9/1 (2023), pp. 20220280.

MEHOFER, M.

2014 Metallurgy during the Chalcolithic and the Beginning of the Early Bronze Age in Western Anatolia: B. HOREJS - M. MEHOFER (eds.), *Western Anatolia before Troy. Proto-Urbanisation in the 4th Millennium BC? Proceedings of the International Symposium held at the Kunsthistorisches Museum Wien, Vienna, Austria, 21–24 November, 2012* (OREA 1), Wien 2014, pp. 463-490.

MEYER, N. - KNAPP, A.B.

2021 Resilient Social Actors in the Transition from the Late Bronze to the Early Iron Age on Cyprus: *Journal of World Prehistory* 34 (2021), pp. 433-487.

MONTERO RUIZ, I.

1993 Bronze Age Metallurgy in South-east Spain: *Antiquity* 67 (1993), pp. 46-57.

MONTERO-RUIZ, I. - MURILLO-BARROSO, M. RUIZ-TABOADA, A.

2021 The Beginning of the Production and Use of Metal in Iberia: from Independent Invention to Technological Innovation: *Eurasia Antiqua* 23 (2021), pp. 193-208.

MUHLY, J.D.

1989 The Organisation of the Copper Industry in Late Bronze Age Cyprus: E. PELTENBURG (ed.), *Early Society in Cyprus, Proceedings of the Colloquium Early Society in Cyprus (Edinburgh, April 1988)*, Edinburgh 1989, pp. 298-314.

1991 The Development of Copper Metallurgy in Late Bronze Age Cyprus: N.H. GALE (ed.), *Bronze Age Trade in the Mediterranean* (Studies in Mediterranean Archaeology 90), Jonsered 1991, pp. 180-196.

MUHLY, J.D. - STECH WHEELER, T. - MADDIN, R.

1977 The Cape Gelidonya shipwreck and the Bronze Age metals trade in the Eastern Mediterranean: *Journal of Field Archaeology* 4 (1977), pp. 353-362.

NIGRO, L. - MONTANARI, D. - MURA, F. - BERNABALE, M. - DE VITO, C. - NIVEAU-DE-VILLEDARY, A.MA.
2020 A Sardinian early 1st millennium BC bronze axe from Motya: *Vicino Oriente* XXIV (2020), pp. 57-74.

ÖNİZ, H.

2019 Antalya-Kumluca Bronze Age Shipwreck 2019 studies-first analyses: *Palestine Exploration Quarterly* 15 (2019), pp. 172-183.

PALLOTTINO, M.

1950 *La Sardegna nuragica* (Edizione del 2000 = Biblioteca Sarda 53), Roma 1950.

PAPASAVVAS, G. - KASSIANIDOU, V.

2014 The Development of Metallurgy in Western Anatolia, the Aegean and Southeastern Europe before Troy: B. HOREJS - M. MEHOFER (eds.), *Western Anatolia before Troy. Proto-Urbanisation in the 4th Millennium BC? Proceedings of the International Symposium held at the Kunsthistorisches Museum Wien, Vienna, Austria, 21–24 November, 2012* (OREA 1), Wien 2014, pp. 447-461.

2015 The new status of copper and bronze on Cyprus at the end of the Late Bronze Age: C.F. MACDONALD - E. HATZAKI - S. ANDREOU (eds.), *The great islands: Studies of Crete and Cyprus presented to Gerald Cadogan*, Athens 2015, pp. 230-236. PERNICKA, E.

PEYRONEL, L.

2010 Ancient Near Eastern Economics: The Silver Question between Methodology and Archaeological Data: P. MATTHIAE - F. PINNOCK - L. NIGRO - N. MARCHETTI (eds.), *Proceedings of the 6th International Congress on the Archaeology of the Ancient Near East, May, 5th-10th 2008, "Sapienza" - Università di Roma. Volume 1*, Wiesbaden 2010, pp. 925-948.

- PHILIP, G. - CLOGG, P.W. - DONGWORTH, D. - STOS, S.
 2003 Copper Metallurgy in the Jordan Valley from the Third to the First Millennia BC: Chemical, Metallographic and Lead Isotope Analyses of Artefacts from Pella: *Levant* 35 (2003), pp. 71-100.
- PICKLES, S. - PELTENBURG, E.
 1998 Metallurgy, Society and the Bronze/Iron Transition in the East Mediterranean and the Near East: *Report of the Department of Antiquities* 1998 (1998), pp. 67-100.
- PULAK, Ç.
 1988 The Bronze Age Shipwreck at Ulu Burun, Turkey: 1985 Campaign: *American Journal of Archaeology* 92 (1988), pp. 1-37.
 1998 The Uluburun Shipwreck: An Overview: *International Journal of Nautical Archaeology and Underwater Excavation* 27 (1998), pp. 188-224.
 2001 Evidence from the Uluburun Shipwreck for Cypriot Trade with the Aegean and Beyond: L. BONFANTE - V. KARAGEORGHIS (eds.), *Italy and Cyprus in Antiquity, 1500-450 BCE*, Nicosia 2001, pp. 13-60.
 2005 Who Were the Mycenaeans aboard the Uluburun Ship?: R. LAFFINEUR - E. GRECO (eds.), *EMPORIA. Aegeans in Central and Eastern Mediterranean, Proceedings of the 10th International Aegean Conference/10e Rencontre égéenne internationale (Athens, Italian School of Archaeology, 14-18 April 2004)* ("Aegaeum" 25), Liège 2005, pp. 295-310.
- REBOREDA MORILLO, S.M.
 2015 La economía de prestigio en los poemas homéricos. Los bienes fenicios: J. JIMÉNEZ ÁVILA (ed.), *Phoenician Bronzes in Mediterranean* (Bibliotheca Archaeologica Hispana 45), Madrid 2015, pp. 74-54.
- RENZI, M. - ROVIRA-LLORENS, S. - MONTERO RUIZ, I.
 2012 Riflessioni sulla metallurgia fenicia dell'argento nella Penisola Iberica: *Notizie Archeologiche Bergomensi* 20 (2012), pp. 185-194.
- RICE JONES, M.
 2007 *Oxhide Ingots, Copper Production, and the Mediterranean Trade in Copper and Other Metals in the Bronze Age*. MA Thesis Boston University, 2007.
- RUSSEL, A. - KNAPP, B.
 2017 Sardinia and Cyprus: an alternative view on Cypriotes in the Central Mediterranean: *Papers of the British School at Rome* 85 (2017), pp. 1-35.
- SABATINI, S.
 2016 Revisiting Late Bronze Age oxhide ingots: Meanings, questions and Perspectives: O.C. ASLAKSEN (ed.), *Local and Global Perspectives on Mobility in the Eastern Mediterranean* (Papers and monographs from the Norwegian Institute at Athens 5), Athens 2016, pp. 15-62.
- SABATINI, S. - LO SCHIAVO, F.
 2020 Late Bronze age metal exploitation and trade: Sardinia and Cyprus: *Materials and Manufacturing Processes* 35.13 (2020), pp. 1501-1518.
- SHERRATT, S.
 1993 Commerce, iron and ideology: Metallurgical innovation in 12th-11th century Cyprus: V. KARAGEORGHIS (ed.), *Cyprus in the 11th century B.C.: Proceedings of the international symposium organized by the Archaeological Research Unit of the University of Cyprus and The Anastasios G. Leventis Foundation, Nicosia 30-31 October, 1993*, Athens 1993, pp. 59-106.
 2000 Circulation of Metals and the End of the Bronze Age in the Eastern Mediterranean: C.F. PARE (ed.), *Metals Make the World Go Round: The Supply and Circulation of Metals in Bronze Age Europe: proceedings of a conference held at the University of Birmingham in June 1997*, Oxford 2000, pp. 82-98.

SNODGRASS, A.M.

1980 Iron and early metallurgy in the Mediterranean: T.H. WERTIME - J.D. MUHLY, J.D. (eds.), *The Coming of the Age of Iron*, New Haven - London 1980, pp. 335-374.

1982 Cyprus and the beginnings of iron technology in the Eastern Mediterranean: J.D. MUHLY - R. MADDIN - V. KARAGEORGHIS (eds.), *Early Metallurgy in Cyprus, 4000-500 BC: Acta of the international archaeological symposium. Larnaca, Cyprus, 1st - 6th of June 1981*, Nicosia 1982, pp. 285-296.

SHERRATT, A.G. - SHERRATT, S.

1991 From Luxuries to Commodities: The Nature of Mediterranean Bronze Age Trading Systems: N.H. GALE (ed.), *Bronze Age Trade in the Mediterranean* (Studies in Mediterranean Archaeology 90), Göteborg 1991, pp. 351-386.

STOS-GALE, Z.A. - MALIOTIS, G. - GALE, N.H. - ANNETTS, N.

1997 Lead Isotope Characteristics of the Cyprus Copper Ore Deposits Applied to Provenance Studies of Copper Oxhide Ingots: *Archaeometry* 39 (1997), pp. 83-123.

TYLECOTE, R.F.

1992 *A History of Metallurgy*, London 1992.

TUSA, S.

2018 *I popoli del Grande Verde. Il Mediterraneo al tempo dei faraoni* (Mediterraneo e Storia 16), Ragusa 2018.

2020 La società siciliana e il «contatto» con il Mediterraneo centro-orientale dal II millennio a.C. agli inizi del primo millennio a. C.: *Sicilia Archeologica* 98 (2000), pp. 9-39.

VAGNETTI, L.

2010 Western Mediterranean: E. CLINE (ed.), *The Oxford Handbook of the Bronze Age Aegean (ca. 3000-1000 BC)*, Oxford 2010, pp. 890-905.

VAGNETTI, L. - LO SCHIAVO, F.

1989 Late Bronze Age Long Distance Trade in the Mediterranean. The Role of the Cypriots: E. PELTENBURG (ed.), *Early Society in Cyprus, Proceedings of the Colloquium Early Society in Cyprus (Edinburgh, April 1988)*, Edinburgh 1989, pp. 217-243.

WATROUS, L.V.

1989 A Preliminary Report on Imported "Italian" Wares from the Late Bronze Age Site of Kommos on Crete: *Studi Micenei ed Egeo-Anatolici* 27 (1989), pp. 69-79.

WATROUS, L.V. - DAY, P.M. - JONES, R.E.

1998 The Sardinian Pottery from the Late Bronze Age Site of Kommos in Crete: Description, Chemical and Petrographic Analyses and Historical Context: M.S. BALMUTH - TYKOT R.H. (eds.), *Sardinian and Aegean Chronology: towards the Resolution of Relative and Absolute Dating in the Mediterranean* (Studies in Sardinian Archaeology V), Oxford 1998, pp. 337-340.

WEBSTER, G.S.

1996 *A Prehistory of Sardinia, 2300-500 B.C.* (Monographs in Mediterranean Archaeology 5), Sheffield 1996

YALOM-MACK, N. - GALILI, E. - SEGAL, I. - ELIYAHU-BERAR, A. - BOARETTO, E. - SHILSTEIN, S. - FINKELSTEIN, I.

2014 New Insights into Levantine Copper Trade: Analysis of Ingots from the Bronze and Iron Ages in Israel: *Journal of Archaeological Science* 45 (2014), pp. 159-177.

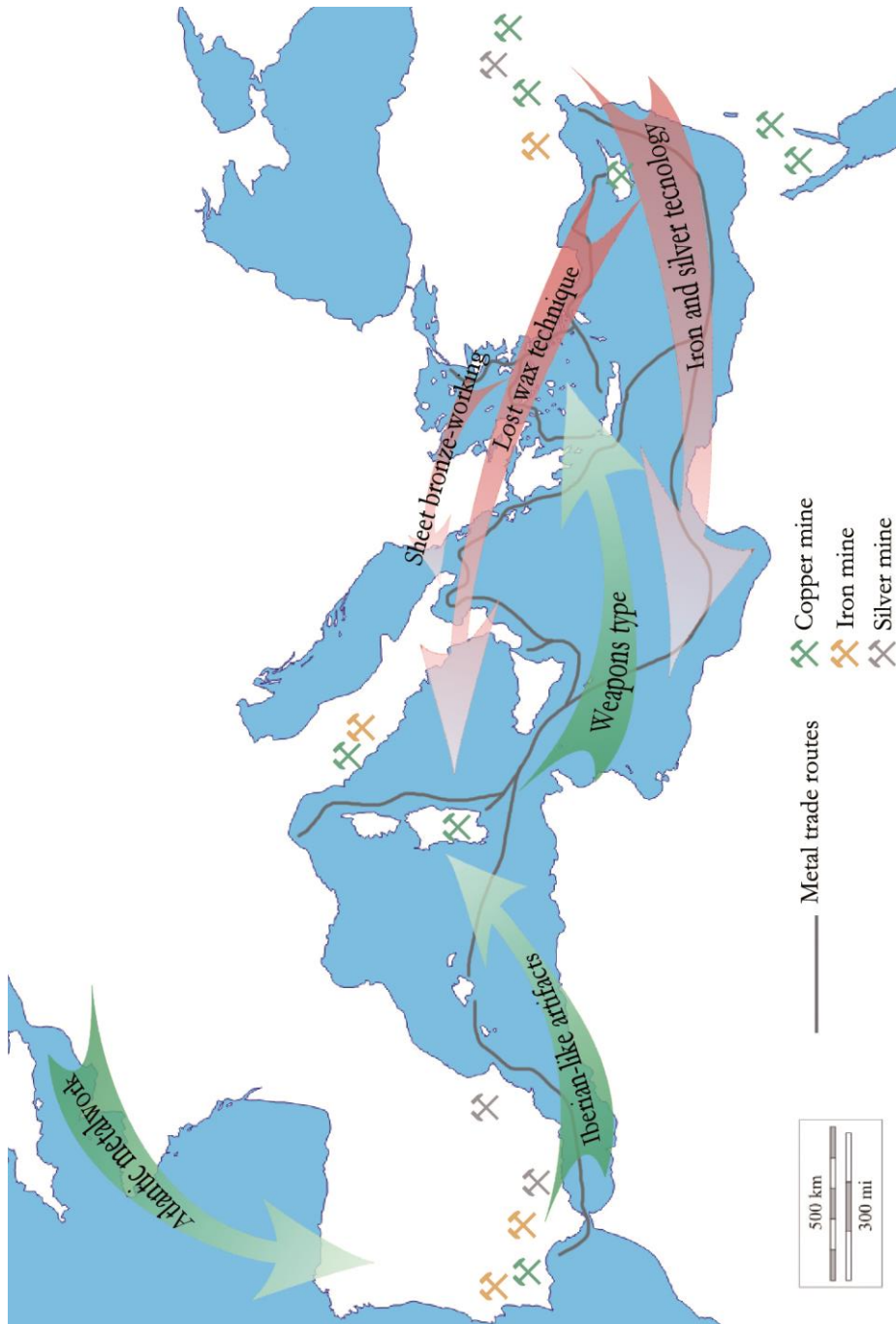


Fig. 1 - The metallurgical *koinè* in the Mediterranean Metal trade routes, technological skills, and metal products exchange net between the 14th and 10th century BC.



Fig. 2 - Bronze four-sided stand with figural decoration on each panel, especially in foreground a male figure facing a tree bearing an oxhide ingot over shoulder (British Museum 1920,1220.1; 1250 - 1050 BC) from Cyprus, possibly Kourion.