THE WORLDS OF THE INDIAN OCEAN

A Global History

VOLUME I

From the Fourth Millennium BCE to the Sixth Century CE

PHILIPPE BEAUJARD

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Volume I provides in-depth coverage of the period from the fourth millennium BCE to the sixth century CE.

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General Editor

Philippe Beaujard

Centre National de la Recherche Scientifique, Paris

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A revised and updated translation

Written and translated by

Philippe Beaujard

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This book is dedicated to my mother Odette Beaujard-Barreau, who died on May 28, 2009, to my father Lucien Beaujard, who died on December 14, 2010, and to my friend Ernest Hudspith, who died on October 22, 2010.

Cargoes

Quinquireme of Nineveh from distant Ophir,
Rowing home to haven in sunny Palestine,
With a cargo of ivory,
And apes and peacocks,
Sandalwood, cedarwood, and sweet white wine.

Stately Spanish galleon coming from the Isthmus,
Dipping through the Tropics by the palm-green shores,
With a cargo of diamonds,
Emeralds, amethysts,
Topazes, and cinnamon, and gold moidores.

Dirty British coaster with a salt-caked smoke stack,
Butting through the Channel in the mad March days,
With a cargo of Tyne coal,
Road-rails, pig-lead,
Firewood, iron-ware, and cheap tin trays.

John Masefield

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ABBREVIATIONS

BCE	before the Common, Current, or Christian Era
BP	before the present
c.	century
c.	*circa*
CAD	*Chicago Assyrian Dictionary*
CE	Common, Current, or Christian Era
E.	East
g	gram(s)
MC	Middle Chronology
N.	North
PAN	Proto-Austronesian
p.c.	personal communication
PB	Proto-Bantu
PMP	Proto-Malayo-Polynesian
S.	South
SC	Short Chronology
Skt.	Sanskrit
W.	West

PREFACE

This English edition of my two-volume book *Les mondes de l'océan Indien*, published by Armand Colin, Paris, in 2012, serves several purposes. First of all, of course, it aims to make my work available to English-speaking readers, thus decompartmentalizing knowledge between anglophone and francophone countries. This second edition has also given me the opportunity to update my work, by using books and articles that I had not previously been able to read. These include the second volume of V. Liebermann's *Strange Parallels* (2009);[1] a synthesis on the fourth millennium BCE published by G. Algaze in 2008;[2] and a book edited in tribute to I. Glover (2010).[3] Taking recently published work into account has also allowed me to refine or modify the perspective I propose, on certain points, and to respond to comments made on the first edition. One example that comes to mind is my analyses of the birth of the state in Mesopotamia and of the historical significance of the northernmost part of that region;[4] another example involves the crucial role played by central Asian nomads in the development of South Asia.[5] It was also necessary for me to reflect the dynamism of research being conducted in areas such as China,[6] India,[7] East Africa,[8] continental and

[1] V. Liebermann, *Strange Parallels, Southeast Asia in Global Context, c. 800–1830,* vol. II: *Mainland Mirrors: Europe, Japan, China, South Asia, and the Islands*, Cambridge University Press, 2009.

[2] G. Algaze, *Ancient Mesopotamia at the Dawn of Civilization*, University of Chicago Press, 2008.

[3] B. Bellina, E. A. Bacus, T. O. Pryce, and J. Wisseman Christie (eds.), *50 Years of Archaeology in Southeast Asia, Essays in Honour of Ian Glover*, Bangkok: River Books, 2010.

[4] J. Ur, "Cycles of civilization in northern Mesopotamia, 4400–2000 BC," *Journal of Archaeological Research*, 18 (4) (2010), pp. 387–431; J. Oates, "The rise of cities in Mesopotamia and Iran," in C. Renfrew and P. Bahn (eds.), *The Cambridge World Prehistory,* vol III: *West and Central Asia and Europe*, Cambridge University Press, 2014, pp. 1474–1497.

[5] R. Palat, *The Making of an Indian Ocean World-Economy, 1250–1650: Princes, Paddy Fields, and Bazaars*, London and New York: Palgrave Macmillan, 2015.

[6] L. Liu and X. Chen, *The Archaeology of China: From the Late Paleolithic to the Early Bronze Age*, Cambridge University Press, 2012; R. B. Campbell, *Archaeology of the Chinese Bronze Age*, Los Angeles: The Cotsen Institute of Archaeology Press, 2014.

[7] R. Mukherjee (ed.), *Pelagic Passageways: The Northern Bay of Bengal before Colonialism*, New Delhi: Primus Books, 2011; R. Tomber, *Indo-Roman Trade: From Pots to Pepper*, London: Bloomsbury, 2012; Palat 2015.

[8] P. Sinclair *et al.*, "Trade and society on the South-East African coast in the later first millennium AD: the case of Chibuene," *Antiquity*, 86 (2012), pp. 723–737; P. Mitchell and P. Lane (eds.), *The Oxford Handbook of African Archaeology*, Oxford University Press, 2013; N. Boivin *et al.*, "East Africa and Madagascar in the Indian Ocean world," *Journal of World Prehistory*, 26 (2013), pp. 213–281; F.-X. Fauvelle-Aymar, *Le rhinocéros d'or: histoires du Moyen Âge africain*, Paris: Alma Éditeur, 2013; J. Fleisher *et al.*, "When did the Swahili become maritime?," *American Anthropologist*, 117 (1) (2015), pp. 100–115; S. Wynne-Jones, *A Material Culture. Consumption and Materiality on the Cost of Precolonial East Africa*, Oxford University Press, 2016; B. Zhao, "Luxury and power: the fascination with Chinese ceramics in medieval Swahili material culture," *Orientations*, 44 (3) (2013), pp. 71–78; R. E. Dewar *et al.*, "Campements de cueilleurs-chasseurs dans l'extrême nord de Madagascar: travaux préliminaires à Ambohiposa et Lakaton'i Anja," *Taloha*, 21 (2015); J. Hawkes and S. Wynne-Jones, "India in Africa: trade goods and connections of the late

insular Southeast Asia,[9] as well as research done in fields such as the history of cultivated plants[10] and the study of climate change,[11] with the latter seen as a key player in the evolution of societies and in processes of globalization, within the framework of a "systemic logic" as I attempt to show in this book (see the Epilogue).

This edition has given me an opportunity to further develop the concept of the world-system and to expand the study of the processes of dominance and coevolution that accompanied increasing interconnections between cores and other regions.[12] While the present analysis focuses on periods prior to the sixteenth century, it sheds light on the ensuing era, and may also provide some hints as to the possible futures of the system. I disagree with I. Wallerstein by positing the existence of world-systems in periods much earlier than the modern period; in fact, I place their existence as far back as the fourth millennium BCE, to the birth of the state. I also differ from Wallerstein by demonstrating the early existence of trade, not only in luxury goods, but also in raw materials and basic products. I also take a different view from A. G. Frank by clearly distinguishing capitalist practices and capitalism on the one hand, and by setting my work within a framework of global history, on the other: in particular, I take into

first millennium," *Afriques*, 6 (2015), http://afriques.revues.org; M. Wood, "Divergent patterns in Indian Ocean trade to East Africa and Southern Africa between the 7th and 17th centuries CE: the glass bead evidence," *Afriques*, 6 (2015), http://afriques.revues.org.

9 T. Hoogervoorst, "Southeast Asia in the ancient Indian Ocean World: combining historical linguistic and archaeological approaches," Ph.D. thesis, Oxford University, 2012; M. L. Tjoa-Bonatz, A. Reinecke, and D. Bonatz (eds.), *Crossing Borders: Selected Papers from the 13th International Conference of the European Association of Southeast Asian Archaeologists*, Singapore: NUS Press, 2012; C. Higham, *Early Mainland Southeast Asia. From First Humans to Angkor*, Bangkok: River Books, 2014; B. Bellina, "The inception of the trans-national processes between the Indian Ocean and the South China Sea from an early city-state on the Thai–Malay peninsula (fourth–second century BCE)," in M.-F. Boussac, S. Roychoudhury, J.-F. Salles, and J.-B. Yon (eds.), *Proceedings of the International Conference "The Ports of the Indian Ocean, from the Red Sea to the Gulf of Bengal,"* Delhi: Primus Books, 2017, pp. 463–492.

10 Hoogervoorst 2017; D. Q. Fuller and E. Hildebrand "Domesticating plants in Africa," in P. Mitchell and P. Lane (eds.), *The Oxford Handbook of African Archaeology*, Oxford University Press, 2013, pp. 507–526; D. Q. Fuller, "Post-Pleistocene South Asia: food production in India and Sri Lanka," in C. Renfrew and P. Bahn (eds.), *The Cambridge World Prehistory,* vol. I: *Africa, South and Southeast Asia and the Pacific*, Cambridge University Press, 2014, pp. 389–406; R. Spengler *et al.*, "Early agriculture and crop transmission among Bronze Age mobile pastoralists of Central Eurasia," *Proceedings of the Royal Society*, 281 (2014), http://rspb.royalsocietypublishing.org/content/281/1783/20133382.full.html#ref-list-1; A. Crowther *et al.*, "Ancient crops provide first archaeological signature of the westward Austronesian expansion," *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 113 (24) (2016), pp. 6635–6640; P. Beaujard, *Histoire et voyages des plantes cultivées à Madagascar avant le XVIe siècle*, Paris: Karthala, 2017.

11 B. Christiansen and F. C. Ljungqvist, "The extra-tropical Northern Hemisphere temperature in the last two millennia: reconstructions of low-frequency variability," *Climate of the Past*, 8 (2012), pp. 765–786; C. Martin-Puertas *et al.*, "Regional atmospheric circulation shifts induced by a grand solar minimum," *Nature Geoscience*, 5 (2012), pp. 397–401; I. G. Usoskin, "A history of solar activity over millennia," *Living Reviews in Solar Physics*, 10 (1) (2013), doi: 10.12942/lrsp-2013–1; J. L. Brooke, *Climate Change and the Course of Global History: A Rough Journey*, Cambridge University Press, 2014; J. Esper *et al.*, "Northern European summer temperature variations over the Common Era from integrated tree-ring density records," *Journal of Quaternary Science*, 29 (5) (2014), pp. 487–494.

12 Cf. also P. Beaujard, "Ancient world-systems and processes of domination, coevolution, and resistance: the example of the East African coast before the seventeenth century," *Actuel Marx*, 53 (2013), pp. 40–62, and "Pour une approche systémique en histoire globale," *Cahiers philosophiques*, forthcoming.

account interactions and dynamics between societies and the environment (here we can speak of a socio-ecological system).[13] Global history is basically characterized by a transdisciplinary approach which transcends the usual thematic and disciplinary fragmentation: global history is not merely a historiographical current, but a "metadiscipline,"[14] anchored in an already long-standing tradition, one which is quite different from what we know as "connected history" or World History.

[13] On this concept, see for example F. Berkes and C. Folke (eds.), *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, Cambridge University Press, 1998; E. Sheppard and R. B. McMaster (eds.), *Scale and Geographic Inquiry: Nature, Society, and Method*, Malden, MA, and Oxford: Blackwell, 2004; and A. Hornborg and C. Crumley, *The World System and the Earth System: Global Socioenvironmental Change and Sustainability since the Neolithic*, Walnut Creek, CA: Left Coast Press, 2007. See my Prologue and Epilogue.

[14] L. Berger, "La place de l'ethnologie en histoire globale," *Monde(s)*, 3, 2013, pp. 193–212.

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Prologue

Truth resides in a panoramic view rather than a local view of events.
(Polybius, second century BCE)

Une nouvelle connaissance de l'organisation est de nature à créer une nouvelle organisation de la connaissance.
New thinking about organization can lead to a new organizing of our thinking.
(E. Morin)

Like the Mediterranean Sea, as described by the historian F. Braudel (1949), the Indian Ocean was traversed from the earliest times by men in quest of goods, new lands, or simply the great unknown. These journeys yielded wealth, knowledge, and power. At the same time, terrestrial routes linked far-flung regions of the Ancient World: these included the famed Silk Roads, but also routes between China and India via Burma, routes over the steppes, north–south routes, and more. Over the centuries, exchanges transformed the Ancient World into a unified and hierarchized area, in which the Indian Ocean occupied a central position.

Exchange Networks and Globalization

Trade – primarily long-distance trade – played a crucial role in this process of integration. Trade implies not only an exchange of goods, but also an exchange of knowledge, beliefs, and values. Exchange networks extended far beyond the borders of the Indian Ocean. This ocean should not be viewed as an entity that evolved in parallel to the Mediterranean, as K. Chaudhuri (1985) has suggested, but rather as an area that became integrally tied to the Mediterranean. Over time, from China to Europe and Africa, the routes of the ships and the roads of the caravans gradually built up a wide zone in which events and regional developments occurred *interdependently*. The fact that the various regions of the Ancient World united by trade experienced such a demonstrable synchronization in their development suggests (but is not yet proof of) the systemic nature of their relationship. It is not merely their interconnections nor the size of their networks but the regularity, intensity, and speed of their exchanges which gave rise to the progressive integration and shaping of these varied regions into an

Afro-Eurasian world-system. This probably occurred as early as the beginning of the Christian era (Beaujard 2009, 2012).

What Is a World-System?

Related to the Braudelian model, the concept of the world-system was introduced by I. Wallerstein (1974b) for the modern period. Among the characteristics of his world-system, Wallerstein emphasizes the ever-increasing accumulation of capital, a transregional division of labor,[1] growing imbalances in power between what have been termed "cores" and "peripheries," phases of hegemony – within any given core – that alternate between a single power exercising control and several rival powers vying for control, and lastly the existence of cycles. A transregional division of labor implies the creation of unequal exchanges in which the system's centers (its cores) – taking advantage of an efficient harnessing of the labor force, of their ability to innovate, and of their politico-military power – produce and sell manufactured goods in markets where they are able to establish more or less monopolistic conditions. Conversely, peripheries, essentially, must sell raw materials and slaves in competitive markets. As for semi-peripheries, these are positioned as interfaces between centers and peripheries; the semi-peripheries thus combine organizational and institutional characteristics from both ends of the system's hierarchy.

World-system analysis has been profoundly renewed by recent research that takes into account other areas (Africa, Asia, the Indian Ocean, and the China Sea) as well as other periods, much earlier than those studied by Wallerstein and his followers (Norel 2009b). This research stresses the need to grasp all the interactions among the three levels: local, regional, and global. It also shows that in addition to any matters of economic, political, and ideological dominance, the relationship between core and periphery can lead to processes of co-evolution, with some regions benefiting from the dynamics of the system due to their geographic and human assets. Moreover, peripheries have never remained passive; researchers have generally paid too little attention to the fact that some peripheries have shown a real "capacity for negotiation" with the dominant centers (Beaujard 2013).

Today, the world-system analysis is recognized as one of the major currents in global history (Beaujard *et al.* 2009: 44ff.). A number of researchers have attempted to use this concept to help understand processes of globalization in ancient periods (as early as the Bronze Age), often modifying the notion in order to do so (Schneider 1977; Ekholm and Friedman 1982; Rowlands *et al.* 1987; Kohl 1987; Edens and Kohl 1993; Algaze 1993, 2008; Frank and Gills 1993c; A. Sherratt 1994a, 1994b; Chase-Dunn and Hall 1997; Kristiansen 1998; Ekholm-Friedman 2000, 2005; Friedman 2000; Kristiansen and

[1] I will use the notion of spheres of interaction to denote zones where exchanges do not lead to the instauration of a significant transregional division of labor (which is fundamentally different from a world-system). The division of labor allows us to distinguish between a *margin* and a *periphery*: whereas a periphery is structurally interdependent with the other parts of the system, a margin is an area that does not depend on contacts with the system, even in cases where such contacts have begun to transform it (Sherratt 1994b; Chase-Dunn and Hall 1997: 69).

Larsson 2005; Beaujard 2005, 2009, 2010a, 2010b, 2011a; Gills and Thompson 2006; Wilkinson *et al.* 2011). On the other hand, research has emphasized the crucial role played by some regions of Africa and Asia – particularly China – in the evolving Afro-Eurasian world-system. Broadening the scope of reflection has highlighted the Eurocentric character of much of the material published, and has led some to question the origins of the Industrial Revolution and the so-called "Rise of the West" (Abu-Lughod 1989; Frank 1998; Mielants 2007; Norel 2009b).[2]

Based on geographic factors and exchange networks, the Asian and East African maritime zones can be divided into three main areas: the China Sea, the eastern Indian Ocean, and the western Indian Ocean, with the latter area being further divided – except during some rare moments of unity – between the Persian Gulf and the Red Sea. From the first through the sixteenth century, the Eurasian and African world-system was organized around five "cores" – sometimes multi-centered – which held a position of economic, cultural, and sometimes political dominance over their peripheries; these cores were (1) China, (2) India, (3) western Asia, (4) Egypt, and (5) Europe (the Mediterranean, Portugal, and then northwestern Europe). As early as the Tang period, China enjoyed a preeminent position that it would maintain for the whole period under study. Western Europe – except between the first and third centuries – occupied a significant position only from the fifteenth century onward.

From their positions as nodes of networks, and sometimes at the interfaces of maritime and terrestrial routes, cities directed production and exchange according to a hierarchical structure. Within a given core or periphery, there existed a further hierarchical division between each metropolis and its dependent zones. Urban points linked by long-distance trade created a string of conglomerations or relay points – or "archipelagos of towns" to use Braudel's delightful phrase – whose interconnections formed the spine of the system. Throughout the ages, observers of these types of metropolis have underscored their cosmopolitan Tower-of-Babel character as places fostering interrelationships that gave birth to innovative creations (Gruzinski 1999, 2004). Along the perimeter of the Indian Ocean, trade gave rise to the formation of "fringe cultures," a term and concept used by anthropologist P. Ottino (1974a) to account for the similarities in many of the syncretic societies which developed along the Indian Ocean's rim. The unifying movement of the world-system, transcending political and cultural borders, and leading to what McNeill (1990) has called *commonality*, has – as a corollary – a tendency toward differentiation and cultural pluralism (Friedman 2000). Indeed, the system generates both order and disorder, unity and diversity. Here, I take Morin's definition according to which (1) a system represents both a "*complex* unit and the complex of relations between the whole and its parts," (2) a system is made up of cumulative *interactions*, (3) which constitute the *organization* of the system.[3] The character of this organization is, by nature, both complex and dynamic.

[2] This research program has also been developed by the Californian School: cf. Wong 1997, Pomeranz 2000, Goldstone 2008. M. G. S. Hodgson (1954, 1963) and W. McNeill (1963) have been pioneers in this field.

[3] Morin 1990: 244–245. The global does not simply generate the local; the local is always the result of interactions between different levels (Friedman 1994; Arrighi 1994). A. G. Frank has been rightly criticized because he did not pay enough attention to the internal economic and social organization of societies or to their specific situations.

Not all coasts benefited from the same opportunities to become trade nexuses. Monsoons and strategic locations gave zones intersecting two subsystems privileged positions, hence the successes of Southeast Asia, South India and Sri Lanka, Aden and Yemen, Hormuz and Oman, respectively. The development of maritime trade also depended in part on the relations established between each coast and its hinterland. The same held true for waterways, such as rivers and streams, for the mouths of large rivers have always served as nodal points in the development of commerce and trade. Likewise, the availability of resources and labor naturally played a role in the construction of a system.

Besides geographic data and economic processes, the hierarchized structure of the system is linked to competition between states and between elites. Exchange must be seen in terms of balance of power; it is connected to ideologies – themselves inseparable from political contexts. The dominance of ideologies along exchange networks helps to build the *desirability* of merchandise and to establish the market value of these goods: thus, studies of world-systems must consider the extent to which the economic is embedded in the cultural and the sacred. Like P. Norel (2009b), we can define a core by what can be termed the "agility" of its merchants, the high desirability of its products, a current account surplus "(at least temporary)," and an ability to transform other spaces. All mechanisms which allow a center (core) to (re-)structure other regions should be taken into account.

The expansion of exchanges was a crucial factor in transforming interconnected societies. This expansion often led to the development of production, triggered increased division of labor and innovation, and favored statebuilding. During some periods, in synergy with the geographic growth of exchanges, a symbiosis between the interests of private entrepreneurs and state elites favored progress in markets (commodity markets and factor markets). This is especially clear for the city-states, which were more inclined than country-states to base their development on long-distance trade. It is therefore not surprising that capitalism emerged in Europe from the fifteenth century on, in a process of globalization accompanied by the financialization of the economy (Arrighi 1994; Beaujard, Berger, and Norel 2009; Norel 2009b).

"The Perspective of the World"[4]

Fundamental transformations are noticeable during at least three historical periods: (1) from 3500 to 2400 BCE in western Asia and Egypt and during the second millennium BCE in China, when the state was born along with private means of accumulation; (2) during the sixteenth century, the period of emerging European capitalism and of the creation of a new space centered on Europe, one that encompassed the Americas and West Africa; and (3) during the early nineteenth century's Industrial Revolution – also an ideological revolution – when the capitalist mode of accumulation first rose to preeminence in a world-system that would henceforth link America, Africa, and Eurasia.

In order to shed light not only on the evolutions or mutations, but also on long-term permanent realities, I have chosen to go back as far as the formation of the primordial

[4] Braudel 1984, III: book title.

states of Mesopotamia, Egypt, India, and China, and then follow what I see as the "waves of time," in harmony with Braudel's research proposal. This will lead us to construct a non-Eurocentric history of the Ancient World that should restore to Africa and Asia their "stolen heritage" (Hobson 2004; Goody 2007). In this way, we will grasp the proper origins of the Afro-Eurasian[5] world-system, which began to take form at the start of the Christian era.

A Note on the History of Money

Among specifically focused histories, the history of money is obviously of particular interest. I use the term "money" to denote goods that possess at least some of the functions we take for granted in modern currencies: they were a means of account, a means of payment, and a store of value. Money was the lifeblood of the economy, stimulating transactions and production; it was closely linked to the politico-religious field and – more generally speaking – to the social order; money played a growing role in the construction of the system. "The adoption of money signals that critical changes are taking place within the society" and between societies (Wicks 1992: 7). By lowering the transaction costs, money fosters the credit market and economic specialization, and contributes to economic development (Silver 1995: 157). Public institutions played a crucial role in the rise of money during the third millennium in Mesopotamia (weighed silver), and during the first millennium in western Asia (minted coinage) and in China (cast coinage), all building on the opportunities that money provided for extracting and mobilizing wealth. Coin minting often had motivations other than economic transactions: money expressed a ruler's sovereignty, and established social relations (Aglietta and Orléan 1998, 2002; Breton 2002). Money often served administrative purposes or was used within the context of grants to religious institutions before being used by merchants. Whatever its function, in order to be efficient, money requires either a centralized power or community's authority, which is able not only to promote its standardization and the acceptance of the monetary units, but also to control its issuance.

The geographical area of money or of a type of money provides information on the exchanges and hierarchies present within this area. As early as the fourteenth century, Ibn Khaldun noted the role that money and precious metals played within a global system. The use of money partly helps to compensate commercial deficits. In theory, a money can only be used between regions if the differences in price of the materials from which it is made renders its transport profitable, or if the power that issued this money is able to compel its use, or if this money bears a symbolic message that is universally recognized (as is the case for cowries).

Beyond money, it is the entire financial area that must be analyzed: instruments of credit; the functioning of banks; and accounting techniques. As for money, the use of banking instruments and the rise of credit can develop only within a relatively stable, predictable, and unified environment. Arrighi (1994) has highlighted the existence of successive cycles of accumulation in Europe from the fifteenth century onward, revealing a phase of material expansion followed by

[5] Moreover, there were American world-systems, which were almost completely separated until 1492.

a phase of financial expansion. Seen as "a sign of autumn" (Braudel 1979), the phase of financial expansion corresponds to a period of hegemonic transition within the system. Orchestrated by capitalistic oligarchies, these cycles of accumulation are embedded within the larger cycles of the world-system. We should ponder whether similar cycles can be observed for earlier periods and for non-European regions.

From its origins, the Afro-Eurasian world-system developed and was restructured according to the rhythm of economic cycles lasting several centuries (periods of growth followed by periods of decline). Understanding the nature of these cycles provides a key to unlocking the growth and recession or demise of states and urban centers. We will attempt to define the characteristics of these pulsations through the evolution of exchange networks and interconnected areas,[6] and to determine their origins, thus shedding light on the existence of what can be termed "systemic logic," a question too often largely side-stepped by researchers.

In Favor of a Systemic Approach to the History of the Ancient World

Exchange networks helped generate the system. Studying these networks and their transformations may prove to be more illuminating than the compartmentalization proposed by some civilizational, ethnical, or national approaches, which present only a fragmentary and distorted historical view (Douki and Minard 2007). Responses at the local level are insufficient because the local is always a part of the global, even if it does not simply result from the global. The systemic approach, however, does not merely imply a "search for an explanation at the level of the whole." It calls for an understanding of the dynamic processes of interaction and organization between the parts and the whole.[7] We need to perceive how local trajectories, linked to specific historical and geographical conditions, interact with global phenomena.

Continuing L. Febvre's project of global history, F. Braudel (1958: 734) had already suggested linking specific histories in order to comprehend evolutions over the long term: in his words, "history is the addition of all possible histories," and that of all interactions. The transdisciplinary and systemic approach adopted in this book tends toward what can be termed a "geohistory," a "permanent effort to connect time and space," by linking different scales (Grataloup 2003; Capdepuy 2010). In order to do this, we will have to examine the growth and decline of networks against the backdrop of political events, social and ideological evolutions, geographical factors, technological

[6] As R. Mukherjee notes (2011: 9), "investigation into networks" can highlight spatial configurations that are not immediately visible.

[7] Morin rightly stresses that seeking an explanation only at the level of the whole without taking into account the complexity of the system presupposes a vision that simplifies the whole. While "a system is more than the sum of its parts" (Frank 1998: 28, 340ff.), "the whole is also less than the sum of its parts" (Morin 1990: 242–243), something that Frank omitted to note. This omission may explain some biases in Frank's analysis.

innovations, demographic curves, and great epidemics. We will also monitor climatic changes and man's relationship to the environment, each contributing – in connection with other factors – to determine the evolution of world-systems: the latter are truly "socio-ecological systems."[8] This does not imply, however, that ecological factors have always been determinant in the crises of the system (Friedman 2007).

Unfortunately, we have only limited quantitative figures for determining the level of integration of the world-system's various parts for the ancient eras. But the data available from archaeological research and in texts do allow us to estimate the size and intensity of exchange networks and to observe their cycles of expansion and shrinkage. The number and size of the principal cities; their locations; regional urban density; all these provide valuable indications as to the system's general direction of activity (growth or decline) and the system's internal structure. As Morris has done (2013), one can also try to compare social development by evaluating "energy capture," information technology, and war-making capacity.[9] As for archaeological excavations, however, these contain only a portion of the goods traded. Textiles, aromatics, and spices generally left no trace in archaeological layers. Metallic objects, precious or not, were often recycled. As for the movements of people, how can we identify slaves at an archaeological site? Conversely, it is not always easy to understand how and why some goods appear within the contexts where they are found. In addition, some regions have been insufficiently surveyed and excavated. We must take these elements into account when evaluating the data presented.

By situating the analysis at the level of the whole Ancient World, this book will show how the Indian Ocean was progressively unified and became a central space within an Afro-Eurasian world-system. The first volume explores the long path from the formation of the first states (from the fourth millennium onward) to the birth of this Afro-Eurasian system (first through sixth century CE). Data have shed light on the constitution of large spaces that can be considered as systems evolving along cycles. For each period identified, I will first introduce the general evolution of the system(s) under consideration as well as their internal relations;[10] then I will describe the main regions, showing the specificities of their trajectories and the ways in which these regions were shaped by their links with the whole system and – conversely – how these same links acted on the system itself. The second volume traces the expansion of the Afro-Eurasian system until it grew, during the sixteenth century, to include the Atlantic Ocean and a continent previously unknown to the Ancient World: America.

The Formation of a Periphery: The Example of Madagascar

Within the context of this Afro-Eurasian space created by increasing exchanges, Madagascar illustrates a peripheral construction that appeared a few centuries after

[8] On this concept, see Georgescu-Roegen 1971; Chase-Dunn and Hall 1998; Berkes and Folke 1998; Sheppard and McMaster 2004; Hornborg and Crumley 2007.

[9] By energy capture, Morris means "the full range of energy captured by humans, above all food, fuel and raw materials" (2013: 53).

[10] Unlike Braudel (1979, III: 16), I do not consider world-economies as closed autonomous spaces, but as opened spaces (cf. also on this point Norel 2004: 197).

the birth of the system.[11] It is a construction that we will follow throughout the cycles of this system. As a meeting point between the Austronesian, Bantu, and Muslim worlds, Madagascar provides a good example of processes affecting other shores, although it was not an important node in the networks. The multicultural encounter characterizing the "fringe cultures" of the Indian Ocean took place in Madagascar under specific modalities, which varied according to regions and periods (Ottino 1974a, 1974b).

Using all the data available up until the arrival of the Portuguese during the sixteenth century (incursions occurring during later centuries, however, will sometimes shed light on various developments), research conducted on Madagascar will be used to grasp the circumstances under which various types of cultural hybridization or *métissage*, their contents, and their "logics," led to the formation and evolution of Malagasy societies. Contrary to an essentialist vision, which paints an image of isolated societies in juxtaposition, this research will emphasize the syncretisms underlying each culture. Identity represents only the "result of a negotiation," at a specific historical time and in a particular place; identity expresses a balance of power – both intra- and intercultural – that forms within the context of a particular configuration of this hybridization (Amselle 1990: 54). The concepts of fringe culture, networks, and hybridization, however, take on their proper meaning only as parts of a systemic approach and global history. It is in this sense that my research goes beyond what are known as the "anthropology of hybridization" and "connected history."[12]

[11] Madagascar has been my research field since 1972.

[12] These two currents use similar approaches to propose new interpretations of historical and anthropological facts, with particular reference to either Africa (Amselle 1990; Mary 1992) or America (Bernand and Gruzinski 1993; Gruzinski 1999), with similar approaches. Cf. also Gruzinski (2004) and Subrahmanyam (2005). While these approaches emphasize the importance of transcultural exchanges, they do not clearly explain the genesis of the processes of dominance or coevolution or their impact on the changes observed.

Introduction: The Geography of the Indian Ocean and Its Navigation

> The monsoon unfailingly regulated sea-voyages in either direction in the Far East and the warm seas, thus precipitating or interrupting international encounters between merchants.
> (Braudel 1982, II: 126)

The Indian Ocean

The Indian Ocean covers approximately 75 million square kilometers. It is bordered to the west by the African coast and Arabia, to the east by the Thai–Malay peninsula, the Indonesian coasts, and – further south – western Australia. The Asian continent runs along its northern border, with India forming a wide peninsula that divides the northern Indian Ocean into eastern and western parts (the Bay of Bengal and the Sea of India, respectively). The western part of the Indian Ocean extends along both sides of Arabia, with a narrow entrance opening onto the Persian Gulf to the north and the Red Sea to the south. South of India, the Maldive Islands are scattered north of the Equator, while the Chagos Islands lie south of the Equator. The narrow channel of the Strait of Malacca is the crossing point between the Indian Ocean and the China Sea, to the north.

Wind Patterns

Wind patterns, around the world, are determined by the existence of high-pressure zones in the Northern and Southern Hemispheres at both higher and subtropical latitudes. Between these high-pressure zones and the Equator, air flows are deflected by the Earth's rotation (this is the Coriolis effect); it gives birth to the austral and boreal trade winds. The equatorial region is a zone of ascending movements and low pressure. These zones experience seasonal translational movements. The force of these translational movements pushes the trade winds past the Equator; then these winds change direction, toward the southeast for boreal trade winds, and toward the northeast for austral trade winds. In the Indian Ocean, these phenomena give rise to an alternating system of monsoons,[1] which imposes its laws on sailors.

In the Northern Hemisphere, during the boreal summer, Asia's land masses warm more rapidly than the ocean, and an upward movement of air masses occurs on the

[1] From the Arabic *mausim*, plur. *mawāsim*, "period of the year, market, fest, season"; in the Indian Ocean, the term acquired the meaning of "navigational season" (cf. in Ibn Mājid).

continent, causing low-pressure systems over Central Asia and northern China. Both the high subtropical pressure systems of the southern Indian Ocean and the low intertropical pressure systems shift northward, and a southwest monsoon wind blows over the northern Indian Ocean. Conversely, when the boreal winter sets in, the land masses cool more rapidly than the ocean, the phenomena are reversed and now it is a northeast wind that blows over the northern Indian Ocean.

In June, the southeasterly trade winds of the Southern Hemisphere cross the Equator, subjecting all of the northern Indian Ocean to the southwest monsoon. In the east, this flow reaches Sulawesi and the China Sea as a south wind: "Ships from the southern seas came to China with the south-west wind . . .; the half year from May to October was the busiest time at the sea ports" (Filesi 1972: 15).

In October, the subtropical high-pressure area begins to shift southward. East of 80°E, the austral trade wind goes no further than the Equator; a zone of doldrums forms over insular Southeast Asia and another over the Bay of Bengal. Conversely, west of 80°E, the austral trade wind continues to cross the Equator, blowing from the southwest. It even blows from the west between the Equator and 10°N as far as the Gulf of Thailand.

In November, the northeast trade winds travel far to the south in the region of insular Southeast Asia; further west, they go no further than Sri Lanka. In East Africa, the monsoon weakens south of the Pangani River. The southeast trade winds remain in the Southern Hemisphere.

In December, a zone of strong high pressure settles over Central Asia. The boreal trade winds begin crossing the Equator, and in January the southeast trade winds take up their southernmost position. Further east, the Australian continent deflects these winds into south/southwesterly winds, that reach the Javanese coasts and islands further east. The northern Indian Ocean and the China Sea come under the influence of the northeast trade winds. These boreal trade winds blow toward the southeast (as northwest winds) beyond the Equator. The Intertropical Convergence Zone, south of the Equator, extends further south into the western part of the Indian Ocean: it reaches Madagascar, which thus receives both north and northwest winds in its north/northwestern region, while a portion of the Malagasy east coast remains under the influence of the austral trade winds. The Convergence Zone moves south into the Mozambique Channel, a low-pressure area; the Cape Delgado region and the coast north of it are hit by northeast winds.

In March, the high-pressure systems move northward. The northeasterly trade winds return, reaching only as far as Sri Lanka, Malaysia, and Kalimantan; yet, they still cross the Equator in the vicinity of Sulawesi. A southwesterly airstream blows over Oman and India, as well as over the northern part of the Gulf of Bengal. During this period, the Gulf of Bengal is divided into two zones, each subjected to contrary winds, "on both sides of a line of discontinuity running from the Palk Strait to Arakan" (Donque 1965: 49).

In the north, the April northeasterly trade winds continue to return. Only the southern Philippines and the northeastern Kalimantan still receive northeasterly winds. In the Indian Ocean, the austral trade winds now blow beyond the Equator, becoming southwesterly winds, reaching the Gulf of Thailand. Along the southern

coasts of Java and further east, the austral trade winds lose their curve and blow straight from the southeast.

In May, this trend continues. Although the austral trade winds do not yet reach the Equator in the more eastern part of the Indian Ocean, they do cross the Equator west of 90°E. A zone of equatorial calm affects Malaysia, Sumatra, Kalimantan, and the Philippines.

These winds' direction and strength made navigation almost impossible from June to September along the west coast of India. "Most of the Indian harbors were closed at the height of the southwest monsoon. These were preferably reached from the western Indian Ocean ports during the months of August–September, when the ferocity of the monsoon winds and torrential rain would die down somewhat" (Chakravarti 2002a: 49). During the southwest monsoon, as well, it was difficult to sail or berth along the west coast of Malaysia, or on the south coast of Arabia. It was possible, however, to leave at the beginning of this monsoon, around mid-April (according to the Arab pilot Sulaymān al-Mahrī, sixteenth century; Tibbetts 1971: 372). Travel from Oman to India could be undertaken at any time during the year except between May and July. Ships from India's west coast arrived at Aden in April. One traveled from Gujarat to Aden mainly from October to December, with the return journey between March and May. From South India, ships departed between March and June. Ships left Aden to sail to the Malabar coast from October to February, or at the end of the southwest monsoon (late August–September; see below).[2] Between June and October, one could sail back to India along a portion of the South Arabian coastline. Ibn Battūta (fourteenth century) notes that the trip from Calicut to Ẓafār (in Dhofar) lasted one month.

To sail from the west coast of India to the Bay of Bengal and Sumatra, one could leave at the start of the southwest monsoon (the "head of the wind"). "The sailing season from Gujarat toward Malāqa, Shumatra, Tanāsarī, Banjāla and all the 'down-wind' ports," writes Sulaymān al-Mahrī, "[runs] from the 120th to the 160th day from the Nairūz (beginning of the solar year), but the best choice is on the 140th day [this means around April 10, the beginning of the Nairūz at the time of Sulaymān al-Mahrī being around November 21[3]].[4] The sailing season from Manībār [Malabar] toward Malāqa, Shumatra, Tanāsarī, Martaban, Banjāla and all their ports: the 160th day from the Nairūz." One also sailed from the west to the orient at the end of the southwest monsoon: "The sailing season from Aden to Manībār, Konkan and Gujerat: on the

[2] Ray 2002: 69–70; Das Gupta and Pearson 1987: 12; Vallet 2010: 218–219, 545–546. See below the comment made by Villiers (1957: 185): "the north-east monsoon is the season of navigation [for the Arabs], [who] can sail both ways with this monsoon." Tibbetts (1971: 360–382) mentions a two-way traffic between India and the Arabian coast several times during the year (cf. Prins 1970: 7, 15, 20; Sheriff 2002: 213). "Eastward voyages in April and May were occasionally possible" (Tibbetts 1971: 368; Margariti 2007). From Oman to Gujarat, "the sea is not closed for any part of the year" (Ibn Mājid, in Tibbetts 1971: 227).

[3] The year starts with Nairūz, from the Persian Nauruz, "New Year," originally celebrated at the spring equinox. The calendar in the Indian Ocean was a 365-day year: it did not take into account the shortfall of a quarter day with the solar year, so the navigator's calendar was "slipping by 25 days every century" (Sheriff 2002: 213, 223, 225 n. 4).

[4] To sail from Gujarat to Malacca, Ibn Mājid suggests a departure between mid-April and May, and during the first part of September, toward the end of the SW monsoon (Tibbetts 1971: 377).

280th day from the Nairûz [around August 28].[5] . . . The sailing season from Gujerat toward Malāqa, Shumatra, Tanāsarī, Banjāla and all the 'downwind' ports: on the first 300th . . . The season for Manībār toward Malāqa, Shumatra, Tanāsarī and all their ports: on the 310th day" (C. Jouannès, p.c.). From Aden to Malacca, according to al-Mahrī, one departed around August 15. For the return journey, from Malacca to Aden, one left between December 28 and February 16. From China, ships left between the end of November and March 1; a November departure made it possible for ships to reach Malacca and to cross the Bay of Bengal in a single journey (Tibbetts 1971).

As for East Africa, in order to reach its coasts, the Omani pilot Ibn Mājid (fifteenth century) recommended a departure from Aden between the 320th and the 330th day of the year [from the Nairūz] [October 8 to 18, when the author wrote his book; see below], from Hormuz around the 70th day [January 31], from India up to the 80th [February 10], and from Sumatra from the 60th day [January 21] (Tibbetts 1971: 234, 360ff., 378; Sheriff 2002: 213). Fortunately for trade, ships arrived on the East African coast when agricultural activities were minimal. The return from the African coast toward Arabia or India could be made between April and May, before the full rise of the monsoon or at the end of the season, in August. During the thirteenth century, Marco Polo describes sailing from the coast of Malabar to Zanzibar in twenty days, but the return journey lasted three months, due to contrary currents.

On the East African coast, once past Cape Delgado, one sailed in a southerly direction at the beginning of the austral summer. Ibn Mājid writes: "The best season from Kilwa to Sufāla is from the first [day] of the Nairūz to the 50th day [that is to say, from November 14 to January 2], but if you set out from Sufāla, you should do it on the 170th day [around May 11], this is the best season of all. Before that date, you encounter the disastrous Kūs wind [southwest monsoon], which is too weak, and later, it becomes too strong in these headlands and you should sail eastward to the open sea [to avoid being driven ashore]." "The sailing season from as-Sawāḥil to al-Qumr [Madagascar] and its isles, and then to as-Sufāl extends from the first [day] of the Nairūz to the 70th. For the pilot of Kilwa the season is on the 90th day . . .The pilots of al-Qumr have two seasons for as-Sawāḥil" (Khoury 1982: 270, 281; Jouannès 2001: 79, 95). To sail from Sofala to Kilwa, one departed between April 17 and May 17.

Moreover, some areas, such as the Red Sea, have special wind conditions. From June to September, winds and currents facilitate journeys to the entrance of this sea, with northerly winds in most of the Red Sea, and a current which sets to the south-southeast; the winds and currents are partially reversed between October and May, with the most favorable season for sailing back to the north being January and February (Meeks 2002: 324; Pearson 2003: 20). The situation is complex, however, with "winds north-northwest in the northern part of the Red Sea and south–southeast in its southern part. Between these two regions, there is a zone of calms or light and variable winds between 18° and 20° North. The current between November and April sets north-northwest in nearly all of the Red Sea. Travel to the north of the Red Sea, therefore, was not easy, and maritime traffic most often stopped in the zone of calms"

[5] McGrail notes: "It would have been prudent to arrive in southern Indian waters in late September" (2015).

(C. Jouannès, p.c.). This phenomenon partly explains the development of ports such as Berenice, ʿAydhab and Jeddah (see Facey 2004).

It was of vital importance for captains to know the system of monsoons, which dictated the movements of ships. The period when the winds became reversed was a particularly dangerous one. Ibn Mājid writes: "He who leaves India [for Arabia] on the 100th day [after the Nairūz, which means March 2 when the author writes his book] is a wise man; he who leaves on the 110th day will be all right; but he who leaves on the 120th day is stretching the bounds of possibility and he who leaves on the 130th day is inexperienced and an ignorant gambler" (Tibbetts 1971: 231).

The Currents

Ship captains also had to take account of the currents, which depend upon planetary mechanisms, and are affected by changes in temperature and winds.

During the austral summer, between 20°S and 10°S, a South Equatorial Current crosses the Indian Ocean from east to west, at a moderate speed (25 to 30 km per day). This current hits Madagascar at the level of Toamasina (Tamatave), and then divides into two branches. The southern branch joins currents running from South Africa to Australia, south of Madagascar; part of this branch, however, flows around Cape Sainte-Marie (at the southern tip of Madagascar) and runs up the Mozambique Channel. The wider northern branch flows around northern Madagascar, hitting the African coast in the vicinity of Cape Delgado, where a new division occurs: a northern current flows along the Tanzanian coasts, while another current makes its way south into the Mozambique Channel. Two currents of opposite directions and uneven forces thus ride this Channel: a south–north current flows along the west coast of Madagascar, and a north–south current flows along the African coast. Their encounter gives rise to numerous crosscurrents.

During the same period, in the northern Indian Ocean, the northeast monsoon favors a North Equatorial Current, whereas south of the Equator an Equatorial Countercurrent develops, along the 7° South latitude. When it arrives near the African coast, the North Equatorial Current curves southward as a result of the northeast monsoon. Further north, in the Sea of India and even more so in the Bay of Bengal, two systems of currents arise, turning clockwise. In the China Sea, a current flows along the coasts of China and Vietnam; then it arcs southward, reaches southern Sumatra and northern Java and enters the Pacific to feed the Pacific Equatorial Countercurrent.

During the southern winter, the southern currents of the Indian Ocean tend to reach southern Australia directly, and the anticyclonic movement of water is therefore less pronounced. It is during this period, however, that the South Equatorial Current reaches its highest speed, thanks to the southeast trade winds, and due to currents from the Pacific, north of Australia. This gives birth to a more powerful current than before in the Mozambique Channel, and to a strong south–north current along the Kenyan and Somali coasts (the Somali Current), favored by the southwest monsoon.

In the Northern Hemisphere, during the summer, the southwest monsoon favors a west–east monsoon current north of the Equator, a southwest–northeast current along

the South Arabian coast, and a north–south current along India's west coast. The Equatorial Countercurrent completely disappears at this time. In the Gulf of Bengal, the monsoon current sweeps toward the northeast, and northeast–southwest countercurrents appear along the Coromandel coast. In the Gulf of Thailand, west–east currents dominate and in the China Sea we find southwest–northeast currents. A southeast–northwest current flows from southern Sulawesi to southeastern Sumatra, then curves and flows along the east coast of the Thai–Malay peninsula and then toward the northeast along the Indochinese coast.

As for the Red Sea, a dominant current flows from Egypt to Yemen during the summer, whereas during the cooler season the situation is more complex, with south–north currents along the Yemeni and Arab coasts, but north–south currents in the Gulf of Aqaba and along the Sudanese coast. Moreover, many reefs dot this sea, making navigation unsafe (see Pearson 2003: 17).

In the Persian Gulf, the dominant currents beyond Hormuz are northwest–southeast during the summer, and are the reverse during the cooler season.

These geographical data have imposed their laws on sailors. They have determined the routes followed by ships, and the seasons for navigation. I will return to this point when I speak of the Austronesians' trips to the west.

Madagascar

The island of Madagascar extends from 12°S to 25°S; it is 1580 km long, and approximately 550 km wide at its median part. A central plateau with an average altitude of between 800 and 1400 m descends to the eastern coast through two series of cliffs. To the west, the elevation descends more gently via successive plateaus. Several mountains exceed 2000 m in height: Tsaratanàna in the north, Ankaratra in the center, and Andringitra in the central southeast.

Wind patterns determine two large climatic areas: a windward region, hot and humid, and a leeward region, hot and drier. In the austral winter, Madagascar is hit by a dominant flow of eastern trade winds, which tend to take a northeast–southwest direction in the south of the island (Fort-Dauphin), and a southeast–northwest direction in the northeast (Antsiranana). A diffluence occurs off the east coast near the latitude of Vatomandry. Some of the trade winds cross the eastern cliffs, and then take a southwesterly direction toward the southern part of the island.

During the austral summer, in the western Indian Ocean, the Intertropical Convergence Zone crosses the Equator and reaches Madagascar. A low-pressure area forms in the Mozambique Channel. Northern Madagascar is hit by north monsoon winds. Further south, along the west coast, the winds veer westward, under the effect of the Coriolis force. Less active than during the cooler season, the austral trade wind still manages to reach the east coast. Along the coasts, the days are punctuated by alternating sea and land breezes, which are more pronounced on the west coast than on the east coast, and are also stronger in the summer than they are in the cooler season.

The island is divided into four large phytogeographical zones. The east coast, humid, tropical, fringed with lagoons and dunes, was in the past covered with forest, which has

largely disappeared through human activity, except in the northeast and in some parts of the highest cliffs separating the coast and the Highlands. These have given way to zones of pseudo-steppes, with patches of secondary forest where the Traveler's Palm dominates. A series of rivers, necessarily short, range along the coast; the main rivers are the Maningory, Mangoro, Sakaleoña, Mananjary, Faraoñy, Matatàña, Manampatraña, and the Mananara. The extreme northwest (between Nosy Be and the coast south of Antsiranana) also enjoys a humid tropical climate. Along the entire eastern coast north of Manakara, precipitation exceeds 2000 mm annually.

The Highlands, in the past covered by a forest–savanna mosaic, have since been deforested and eroded by human activity (nowadays only residual forests subsist at sacred sites). The Highlands are composed of landscapes of red hills and wetlands, most now converted into irrigated ricefields. Its average annual rainfall varies from 1200 to 1600 mm.

Some large rivers flow down from the Highlands into the western savannas: these are the Sofia, Mahajamba, and Betsibòka rivers, in the northwest, and Manambao, Manambolo, Tsiribihina, and Mangoky rivers, on the west coast. In the latter region, the year is marked by two clearly defined seasons: a very dry "winter" and a humid summer. Annual precipitation is under 1000 mm near the coasts (except in the northwest, which is progressively wetter as one travels further north). The only remaining forest consists of gallery forest along rivers. Several large bays indent the northwest coast, offering harbors for ships.

The south and the southwest of the island experience a semi-arid climate, with sharp irregularities in precipitation averaging from 250 to 500 mm per year. The dry forests of the southwest have also largely been cleared. One finds only one large river in this region, the Oñilahy; it flows to the sea in the Bay of Saint-Augustine, south of Tulear.

The arrival of the first migrants brought enormous changes in the ecosystems of the island, particularly following the introduction of domesticated animals, sheep, goats, and cattle, leading to the progressive disappearance of various wild animals: giant tortoises, dwarf hippos, large lemurs, and giant ratites (*Mullerornis* and *Aepyornis*).

Navigation of the Indian Ocean

> I did not leave one star in the sky that I did not use to guide me.
> (Ibn Mājid, *Sufālīya*; Jouannès 2001: 53)

In order to steer his ship across the ocean, an "ideal pilot" had to know the winds, the currents, and their changes during the year, as well as the lunar mansions, or "the course of the celestial luminaries"; he had to be able to recognize signs and landmarks, the configuration of the coastline, with mountains, capes, islands and their rocks, the color of the water, the birds, the fishes and the seaweeds (Tibbetts 1971: 1–2; Sheriff 2002: 210, 214).

Very early on, sailors learned how to orient themselves by observing the stars, and to assess the latitude of a given place. They invented instruments to measure the positions of certain stars.

Among the Arabs, "latitude" was [notably] measured by gauging the height of the Polaris star (*Jāh*)[6] when the latter was at the lowest point of its trajectory. When a place was situated at Jāh 12, this meant that the Polaris was observed 12 fingers' width above the horizon when this star was 'in its house', in the lowest part of its diurnal rotation . . . Among the Arab pilots of the Indian Ocean, change in latitude had been fixed at one finger [Arabic *iṣba'*], which means 1°45[7] . . . The *tirfā* represented the distance one had to sail in order to observe a variation in latitude of one finger . . . This notion of *tirfā* . . . was known to the three schools of deep-sea pilots who, according to Sulaymān al-Mahrī, sailed across the Indian Ocean: 1. the Arabs, 2. The Indians of Gujarat and Konkan, and 3. the Cholas of the Coromandel coast. (Jouannès 2007b)

When the Muslim world acquired knowledge of the compass from the Chinese, the compass became linked to the rising and setting of certain stars, during the twelfth or thirteenth century (Tibbetts 1971: 3, 290, 295). The Turkish geographer Sidi Ali Çelebi, in his *Mohit* (1554), which is partly based on the works of the *mu'allim* (pilots and scholars) Ibn Mājid (fifteenth–sixteenth century) and Sulaymān al-Mahrī (sixteenth century), describes for the first time a measuring instrument that must have been in common use on ships plying the Indian Ocean. This instrument consisted

of a number of oblong pieces of wood [*loḥ*, 'tablet'] of different sizes with a string or different strings passing through their centers. To measure the height of Polaris in the northern latitudes, or one of the Bears in the southern latitudes, the string was held between the teeth with the wood at a distance from the eye such that while the lower edge [of the wood] was in line with the horizon, [its] upper edge just touched the star. Latitude was calculated in terms of numbers of finger widths (*isbas*) above the horizon. (Sheriff 2002: 216)

"Sidi Çelebi had a system of nine tablets each with a string through it, or with one string through them all. The nine tablets each had a different width corresponding to different angular altitudes on the horizon" (Tibbetts 1971: 316). According to Sidi Çelebi, this was the instrument used by the ancients, but in his own time, he describes "a graduated rod with a small wooden rectangle sliding on it" (see Tibbetts 1971: 316): here we recognize the instrument that the southern Europeans called *ballisti* or Jacob's staff, and which the Portuguese called *balestrilha*, deriving from the Persian *bālā*, "height" and *astar*, "star" (the instrument's origin may go back to Antiquity: during the early third century BCE, the Greek philosophers Timocharis and Aristyllus probably used a Jacob's staff to assess the declinations of some stars). "The *kamal* was improved upon by replacing the different pieces of wood by a single tablet, and the single string was calibrated by a number of knots indicating different latitudes" (Sheriff 2002: 217; 2010: 123) or marking regular intervals of *isba*: here one recognizes the *kamal* described in 1836 by Princep from data provided by a sailor from the Maldives. Note that Ibn Mājid does not use the term *kamal*, and he does not describe the precise way in which the instrument was employed during his time. He mentions only the use by pilots of the Indian Ocean of different "pieces of wood" *khashaba* for measuring stellar altitude (*qiyās*) (the word *khashaba* is sometimes rendered as *khāḍaba* or *ḥataba*)

[6] *Jāh* is "an arabization of the Persian *gah*, 'the place'" (Tolmacheva 1980: 186). For Ibn Mājid, it is a star near Polaris (Tibbetts 1971: 122–123).

[7] Following Ibn Mājid, Malhao Pereira gives 1°36 for one *isba* (2003: 22). According to Sulaymān al-Mahrī, it is 1°43 (Tibbetts 1971: 315).

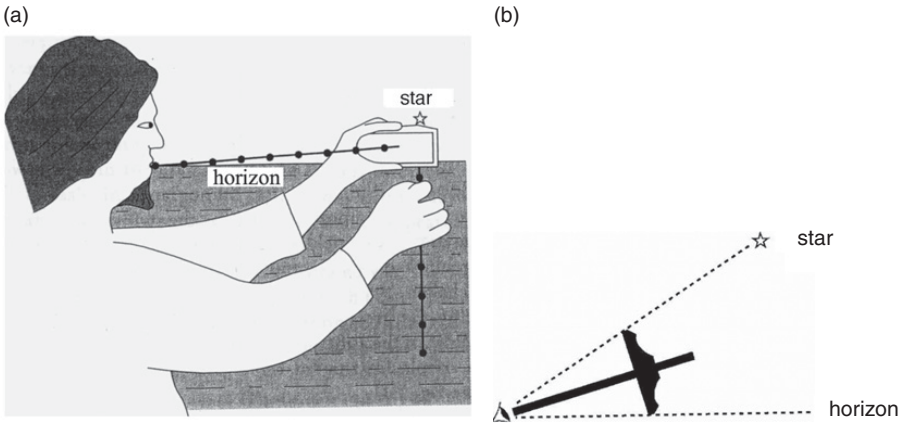


Figure I.In.1 (a) Use of the *kamal* (b) Cross-staff (Jacob's staff). This type of instrument was used in the Greek world during the third century BCE; its use may be older in western Asia. Reproduced from Sheriff 2002: 218,[8] by permission of RoutledgeCurzon Publishers

(Tibbetts 1971: 317). "Ibn Majid takes his stellar altitude measurements using 24 pieces of wood" (Khoury 1985–1986: 215). In his "poem with a rhyme in *mim*" "on the six main *abdāl* methods of using Sharatān (alpha Arietis) and 'Anaq (Urs. Maj.)" (Tibbets 1971: 19), Ibn Mājid writes: "My instrument of measure (*qiyāsī*) [is composed] of 20 pieces of wood and four more in total and necessarily [verse 19]. When stars appear, I shoot arrows to them that meet their goals [verse 20], they do not miss their target thanks to their mark and to the rope whose ends are between the palm [of my hand] and my wrist [verse 21]. [These pieces of wood are] angels who do not deceive [verse 22]" (G. Ducatez, p.c.). "The *khashaba* boards," confirms Jouannès, "were tablets; their top edges were placed in contact with the star while the lower edges touched the horizon at sea. Whereas for the *kamal*, the variable element was the distance from the board to the eye of the observer (measured by knots on a thread attached to the center of the board); in the other case, arm length was constant. It was therefore the dimension of the board that had to be variable, whence the necessity of having a number of boards" (12, or even 24) (Jouannès, forthcoming). These tablets did not allow sailors to observe stars which were too high in the sky. "Measurements practiced by seamen," writes Sulaymān al-Mahrī, "go from one to twelve fingers [from 1°8 to 21°]." "Fatimi shows that a similar instrument ... may have been in use since the ninth century" (Sheriff 2002: 216). Measurements (*qiyās*) did not consist only in evaluating the height of Polaris or the Southern Cross: Ibn Mājid gives as many as seventy types of measurement in the *Fawā'id* (Tibbetts 1971: 325ff.).

A Chinese sailor called Ma-Huai-te, who accompanied Zheng He's expeditions during the early fifteenth century, developed an instrument that probably derived from the cross-staff of the Indian Ocean (Fatimi 1996: 289; Sheriff 2002: 217). This Chinese

[8] See also J. M. Malhao Pereira 2003: 31, fig. 14. Pereira points out that there is a need for correction when the rope is held by the teeth (the distance between the teeth and the board is less than the distance between the eye and the board), so the *kamal* was graduated for a definite user and could not be used by others (2003: 31–33).

reinvention provides a good example of the knowledge exchanges on the scale of the world-system, exchanges that had in fact been occurring since the dawn of this system. The Gujarati pilot who guided Vasco de Gama from East Africa to India used a Jacob's staff, which Vasco de Gama took back to Portugal in 1499, to be tested by Portuguese sailors ("The Portuguese modified the instrument to read degrees directly instead of the standard finger widths of the Arabs") (Sheriff 2002: 219).

It was thus possible to determine the vessel's latitude, but

> Indian Ocean mariners were not able to calculate longitude prior to the introduction of the sextant . . . [They] sailed first to the latitude of the destination, and then changing course in mid-ocean [they sailed] due east or west until landfall was made . . . Speed of the dhow was calculated by dropping a floating object at the stem of the dhow, and calculating the time it took to reach the stern. East-west measurement of distance was calculated in terms of the *zam* (watch), a standard three hours of sailing [or one-eighth of a degree]. (Sheriff 2002: 217)

The solar calendar of Persian origin was widely used by sailors in the western Indian Ocean, and probably since the Sassanid period.[9] Persia's preeminence during the first centuries of Islam is apparent in boating terminology.[10] This is only one element among others in the elaboration of a culture shared by sailors in the Indian Ocean and the China Sea. Even prior to the Christian era, Arabs, Indians, Austronesians, the inhabitants of southern China, and later the Chinese themselves (from the Han period) were all actively exchanging knowledge and evolving methods of navigational technology. The cosmopolitanism of the ports of the ocean corresponded to that of the crews in the transnational networks.

Exchanges in the Indian Ocean varied according to developments in naval technology. Improvements in the field of shipbuilding allowed ships to travel faster and carry progressively greater loads. We shall see, moreover, that the monsoon system has not remained static over the centuries. In the northern Indian ocean, periods of weak summer monsoons have accompanied phases of low solar activity; conversely, more intense solar activity seems to be correlated with strong summer monsoons. These phenomena are subject to a number of cyclicities.

[9] The use of the Persian calendar may date back to Sassanid times, in the sixth century (Sheriff 2002; Tibbetts 1971: 361).

[10] Ferrand 1924. Cf. the Persian origin of terms such as *bandar*, "port," *nakhuda*, "shipcaptain," *khann*, "a rhumb, interval between each star," "i.e. the points of the compass and their intervals on the horizon," *rahnami* (encountered in Swahili), "navigational instruction." According to Fatimi (1996: 285), the word *kamal* also derives from the Persian *kaman*.

PART I

The Ancient Routes of Trade and Cultural Exchanges and the First States (Sixth–Second Millennium BCE)

Introduction

> Connections across cultural and other boundaries should serve as an organizing principle for world history.
> (McNeill 1998a: 221)

During the tenth and ninth millennia BCE, western Asia – slightly earlier than China – witnessed the emergence of the Neolithic, with the cultivation and then the domestication of cereals, pulses, and a fibrous plant (flax), in what has been called the Fertile Crescent. Animals were also domesticated: goats, sheep, cattle, and pigs.[1] Agriculture and stockbreeding allowed a sedentarization of the communities, which was accompanied by changes in the social organization and systems of beliefs (Cauvin 1997).[2]

As early as the eighth or seventh millennium, plants and animals domesticated in western Asia were carried to Egypt, Greece, and then to Crete. To the east, they spread to Turkmenistan and the Indus valley (Mehrgarh) during the seventh millennium, along terrestrial and perhaps maritime routes.[3] This diffusion may have involved movements of population, or have taken place along long-distance exchange networks that can be detected through the discovery of obsidian from Anatolia in the Levant and in Mesopotamia, or of shells from the Persian Gulf in Mesopotamia, or from the coasts of Sind at Mehrgarh, during the fifth millennium.[4] Mehrgarh in this period shows lapis lazuli from Afghanistan, turquoise, and copper.

Sea voyages probably took place in the Persian Gulf and along the coasts of South Asia even before the emergence of the Neolithic.

The development of irrigation in Mesopotamia led to progress in agriculture, which provided the basis for demographic growth. The rise of trading exchanges fostered innovations such as the breeding of sheep, the wool of which was used in developing textile crafts (woolly sheep may have evolved in colder regions such as the Pontic-Caspian steppe [Cunliffe 2015: 74]). At the same time, one notes institutional innovations – a new

[1] For the animals, genetic research shows that several domestications usually occurred, in various regions. Goats, for example, seem to have been domesticated both in western Asia and in Iran or western Pakistan (Luikart *et al.* 2001). Cattle could have been domesticated early on, in the Sahara, Egypt, and the Fertile Crescent (Bradley and Loftus 2000).

[2] Hocart (1954) suggests a ritual origin for agriculture, and for the invention of the plow.

[3] J. Diamond rightly speaks of "founding cultures" for the plants cultivated in western Asia, which provided the basis for the rise of the Egyptian and Indian civilizations (Indus), along with the animals native to the same region (1997: 188). Moreover, the middle Ganges valley and the Deccan may have represented other centers of agricultural domestication (rice, millets, and pulses) in the third and second millennia BCE (see below). In Central Asia, agriculture and stock breeding with West Asian species arrived during the sixth millennium in Kazakhstan, Tajikistan, and the central Fergana valley (Fuller 2006a: 28).

[4] As early as the PPNB (Aceramic Neolithic, phase B, second half of the ninth millennium BCE), trade networks developed, as revealed by the find at Jericho of obsidian from Anatolia, jadeite from northern Syria, and turquoise from Sinai.

social hierarchization was accompanied by the appearance of collective buildings sometimes called "temples" – and by the expansion of the 'Ubaid culture (*c.* 5300–4100 BCE) outside Mesopotamia, at least from the Ubaid 3 phase (Oates 2014). This expansion was probably based on the spread of techniques and religious ideas, which explains the homogeneity of the 'Ubaid culture. The exchange networks extended to northern Mesopotamia, northern Syria, southeast Turkey, western Iran, and the Persian Gulf, where the 'Ubaid people introduced domestic animals and domesticated plants, and probably transmitted shipbuilding techniques. They may already have been plying the Persian Gulf to obtain myrrh and incense, which were transported from southern Arabia (Zarins 2002).

The 'Ubaid expansion, which prefigured the flowering of the Sumerian civilization during the Urukian period, expressed new needs, in aromatics, wood, precious stones, and, during its final phase, metals. Copper metallurgy appeared during the sixth millennium in Anatolia, and during the fifth millennium in Mesopotamia, Iran, Pakistan, and southeast Europe, whence it progressed to the north of the Black Sea (4400 BCE), the Middle Danube valley (4000 BCE), and the south of the Iberian peninsula (3800 BCE). Metalworking spread in the Eurasian steppes during the fourth millennium.[5] With copper and then bronze metallurgy, which required access to ores and their transport, trade networks developed on a larger scale, in new social contexts that implied profound ideological and organizational changes.

The end of the 'Ubaid phase *c.* 4100 BCE seems to be linked to a global climatic cooling, accompanied by a process of aridization in the eastern Mediterranean and the Levant.[6]

After the 'Ubaid cultural period, Anatolia and northern Mesopotamia experienced new development, favored by an improvement in the climate. It was marked by the appearance of proto-urban centers (Khirbat al-Fakhar [Hamoukar], Tell Brak . . .), which were connected with Anatolia and with east–west exchange networks extending from Afghanistan to Syria. We clearly observe the development of social complexity from 4400 BCE in northern Mesopotamia, in a process partly distinct from that of southern Mesopotamia. With the town of Tell Brak, northern Mesopotamia shows an incipient urbanization from 3800 BCE, perhaps earlier than in the south,[7] according to some archaeologists (though the earliest levels of Uruk and other sites have never been reached). The recent data from northern Mesopotamia lead Ur to write that "the emergence of the Mesopotamian city must be considered a multicentric phenomenon" (2010: 400). Oates *et al.* (2007: 585) also write: "The 'world's earliest cities' are as likely to have been in northeastern Syria as in southern Iraq, and the model of a core from the south developing a periphery in the north is now ripe for revision." This large northern area, however, appears to have had links to southern Mesopotamia from 3600 BCE, as

[5] It is likely that native copper was used first. Hocart (1954) has suggested a ritual origin for copper and bronze metallurgy.

[6] Staubwasser and Weiss 2007. The end of the fifth millennium also saw the collapse of the Chalcolithic culture of the northern Balkans (Kohl 2007: 52). The extent of this climatic change is still debated.

[7] Ur (2010: 400) writes: "Indeed, the possibility is now raised that northern urbanism predates its appearance in the south."

can be seen from sites such as Tell Brak and Hamoukar, in the Jazira, and the south clearly appears to have been dominant throughout the Middle and Late Uruk periods.

Around 3600 BCE, southern Mesopotamia was experiencing new social transformations, which corresponded to the birth of the state. It would be futile to seek any single cause: it was a combination of factors set in specific economic, political, religious, and environmental contexts that led to this transformation (see Testard 2004). The intensification of agricultural practices – with the development of the ard and of animal traction (Sherratt 2006a) – allowed a growth in output and a new rise in population. It was accompanied by increased social differentiation, the development of various crafts and that of urbanization, around 3600 BCE. The agricultural and human potential of Mesopotamia, its geographical situation at the junction of multiple exchange networks, the possibilities of transport offered by water courses and the ethnic diversity of the region, all influenced its political and economic development, characterized – in contrast to Egypt – by the emergence of an "archipelago" of city-states among which the city of Uruk became preeminent (it is possible that Uruk ultimately became the capital of a country-state).[8] Ecological and technological conditions led to the formation of major estates involving the temple.

The "Urban Revolution" was an ideological revolution within society, but also in its relation to the environment. The Urban Revolution was the time of the "great divorce of culture and nature" (Hughes 2001): the motif of the triumph of man over hostile nature is preeminent in Mesopotamian mythology. The rise of cities was to cause rapid deforestation in a region already sparsely wooded. There may have been lower rainfall in Mesopotamia (an aridification of the Sahara from the middle of the fourth millennium onward has been noted [deMenocal *et al.* 2000]), but precipitation seems to have been plentiful in Anatolia: the water from the rivers, downstream, could be used both for simple or more sophisticated irrigation (Burroughs 2001: 244). The spread of sheep bred for wool and the production of fermented drinks (beer and date wine) represented other innovations of the Urban Revolution,[9] which was marked by changes in clothing and food consumption (Sherratt 2004). The production of new goods appears inseparable from the building of urban hierarchal societies and the increased division of labor within cities and between regions. Exports of goods gave rise to asymmetric exchanges with peripheral regions, "production costs falling as the scale of output increased" (Algaze 2008: 36), and they also fostered local development (thus the social context of drinking fermented beverages in Mesopotamia may have led to the growth of viticulture on the Mediterranean shores, as A. Sherratt (2004) has suggested).

Note that some authors have rejected the idea of an "Urban Revolution." Ur (2014), for example, states that "urbanism evolved within the context of a metaphorical extension of the household." Unlike Pollock (1999), Ur does not see cities as developing

[8] Algaze (2008: 114–115), however, considers Uruk as a purely religious capital (see below).

[9] The concept of innovation, as mentioned, refers to the use of an invention that may be much older (for example, the production of date wine certainly began prior to urbanization). For the fourth millennium, Sherratt (1981) has postulated a second Neolithic Revolution, that of "secondary products" (milk, leather, wool, the plow). Recent research invalidates the idea of innovations in this period (the use of milk, for example, goes back to the Early Neolithic), but confirms a process of diffusion (Greenfield 2005; Issakidou 2006).

as a result of tributary economies and appears to downplay the significance of increased social stratification (see Adams 1981).

The state – or the great households, in Ur's view – played a crucial role in the organization of production and exchanges and in redistribution of wealth. The Urban Revolution benefited from the growth of long-distance trade, which it helped to develop. "Trade was the earliest spur to population clustering" (Algaze 2008: 30), which, along with political and ideological factors, encouraged economic differentiation. Trade was primarily in textiles, slaves, and copper, which was used for producing weapons and tools. This copper came from Iran, northern Iraq, and eastern Anatolia. Various authors have suggested that the flowering of copper – and then bronze – metallurgy constituted a basis for the emergence of political power (Ratnagar 2001b); the absence of local resources in metals, stone, or wood prompted the Mesopotamian elites to secure their supply. Arsenical bronze and later tin bronze metallurgy spread from the fourth millennium along the trade routes, with a possible transfer of this technology from western Asia (where it appeared between 4000 and 3000 BCE) to China (between 3000 and 2000 BCE). The production of bronze tools increased agricultural productivity, and also military power: competition between cities was not always peaceful, and the extension of conflicts certainly played an important role in the construction of the state.[10] It could also be argued that warfare was both a cause and a consequence of asymmetrical growth. Economic and social development was in part linked to the emergence of a new ideology of political control and to institutional innovations. The newly formed public sector provided the managers necessary for the setting up of entrepreneurial centers: capital accumulation in pursuit of efficiency (it may be too early to speak of "profit-seeking") first developed with the state apparatus and the institutions of the temples, and then the palaces (Hudson 1996). Communal lands belonging to extended families came under the management of "institutional houses." One of the most salient "ideational innovations" of the Uruk world was "the systematic use of various types of dependent labourers receiving rations" (Algaze 2008: 128).

The changes in production and exchanges went along with a radically new division of labor, within societies and between regions, with Mesopotamia positioning itself as a center of gravity (we will see that southern Mesopotamia can be considered as the core of the first world-system [Algaze 1993, 2001]). The Urukian culture extended to Susiana and northern Mesopotamia, Anatolia, and the Levant, acting as an interface with more distant regions. Trade between the shores of the Indian Ocean and western Asia on the one hand, and Egypt on the other, a trade which also involved the eastern Mediterranean world, fostered the rise of states or cities, during the fourth and then the third millennium BCE.[11] New forms of labor mobilization and capital accumulation

[10] It is, however, shortsighted to attribute the emergence of the city-states to a matter of defense of the communities, as some authors have proposed.

[11] The usual explanation according to which the management of hydraulic works by an elite favored the building of the state is certainly not valid for all the city-states, even though canals have been discovered at Uruk. Recent research partly invalidates the idea that the Urban Revolution was linked to civilizations based on large hydraulic works. Wittfogel's thesis has been largely abandoned. J. E. McClellan III and H. Dorn (1999: 33–35) have combined the idea of an organization of hydraulics engineering with that of demographic pressure linked to environmental circumscription, a hypothesis perhaps conceivable for Egypt, but unlikely elsewhere. Going against the archaeological data available, McClellan III and Dorn do

developed, involving the use first of servile, and later of hired labor, and the collection of taxes and tributes. Southern Mesopotamia exported textiles and other manufactured goods, and imported mainly raw materials, slaves, and possibly metallic items. The increase in exchanges sheds light on the important role of Central Asia, and the development of Sogdiana and Turkmenistan as early as the fourth millennium and, more importantly, in the third millennium. Mesopotamian influences can moreover be perceived in the Maykop culture (*c.* 3700–3000 BCE), in the western Caucasus (Kohl 2007; Kohl and Trifonov 2014). In the Urals, copper seems to have been exploited at the site of Kargaly as early as the second half of the fourth millennium. On the European side, gold from the Carpathian mountains reached western Asia at the end of the fourth millennium.[12] This expansion was favored by the emergence of political entities in northern Mesopotamia before the middle of the fourth millennium. It was based on economic mechanisms, and also on ideological power and organizational efficiency. "Colonies" and trading posts were established in the north, where cities like Tell Brak and Hamoukar shrank in size and finally came under the control of southern Mesopotamians. Algaze (2008: 117) speaks of an "aborted urbanism" in Upper Mesopotamia.

For Sherratt (2006a), the wheel was probably invented in northern Mesopotamia, Syria, or eastern Anatolia during the Urukian expansion. It was quickly adopted by southern Mesopotamia. This region also enjoyed a more efficient system of communication and transport than the north, through the intensive use of multiple watercourses. Moreover, innovations in one sector led to innovations in others. As Algaze notes (2008: 33), "processes that maximize efficiency in one industry often get adopted by related industries or lead to totally new developments in unrelated fields, thus creating new forms of diversification."

Among the most crucial innovations of the Urban Revolution were techniques of power and new forms of organization. The importance of dependent laborers has already been mentioned. An increasing complexity in glyptics can be noted, with the use of cylinder seals, and imprints of multiple seals, "a glimpse of the number of agents involved in whatever transaction is being recorded" (Algaze 2008: 135). With the progress of exchanges and the development of the state, writing and systematic reckoning appear after 3400 BCE at Uruk in Mesopotamia (writing was first based on "pictograms," then developed into the Sumerian cuneiform during the third millennium), around 3300/3200 BCE in Egypt (hieroglyphic script), and in 3100 BCE in Elam (Proto-Elamite).[13] The development of writing formed one basis for state ideology, and the creation of numerals opened the way to a true "mathematization of the world." There was no direct borrowing from the Sumerian script, but rather a dissemination of

not attribute any role to trade in the process of formation of towns and states. Research today invalidates or leads one to substantially qualify the idea that "the Urban Revolution produced civilizations that depended on large-scale hydraulics engineering" (1999: 41).

[12] J. A. Bakker *et al.* (1999) have suggested that the wheeled wagon spread from northwestern Europe. As P. L. Kohl (2007) emphasizes, whatever the origin of the innovation, it is striking to see how quickly it spread across Europe, the Russian steppes, and western Asia.

[13] I disagree with the idea expressed by J. Ur: "the appearance of writing in the south c. 3200–3100 BCE (Englund 1998, pp. 32–41) was a very late development, likely postdating the collapse of the Uruk expansion" (Ur 2010: 397). See Oates 2014: 1486.

the idea of writing and the development of particular systems, in Egypt, Iran, and later in the Indus valley and Crete. Writing represented a cognitive revolution and, combined with the standardization of weights and measures, became a powerful technique of social control. "The primary function of writing as a means of communication," wrote Lévi-Strauss (1964: 292), "is to facilitate the enslavement of other human beings" (quoted by Algaze 2008: 138). The advent of accounting systems represented a major innovation that gave the state the basis for an effective organization; it also engendered increased social complexity, set in motion by the rise of transregional trade (Hudson and Wunsch 2004). And writing of course allowed for the new accumulation and transmission of knowledge, monopolized by the elites.[14]

In northern Africa, the aridization of Libya and of the eastern desert during the fourth millennium encouraged an intensification of agriculture in the Nile valley. The lands fertilized by the Nile were relatively landlocked; this situation may have favored a centralized political organization and given more stability to the Egyptian system than could the irrigated areas of southern Mesopotamia. Conversely, the latter region benefited from a greater variety of exchange routes: the location and structure of the region of the Tigris and the Euphrates valleys partly explain its instability and dynamism, characteristic of the city-states. The nature of the state in Egypt also derived from the politico-religious features of the societies in which that state originated. The ideological foundations of political power were different from those of Mesopotamia: in Egypt, the figure of the god-king pharaoh was the guarantor of the cosmic and social order, whereas the Mesopotamian "kings" were first and foremost managers and warlords. Order in Mesopotamia resulted from negotiations within cities, between cities, and between urban dwellers and nomads.[15] In Egypt, where urbanization progressed from around 3500 BCE, various competing proto-states dominated sections of the Nile valley and neighboring regions. At the same time, long-distance exchanges developed. Very early on, the Mesopotamian area established indirect contacts with the Nile valley, through the Syrian coast, contacts that were to play a catalytic role in the formation of the state. As was the case for the Urukian world, the expansion of the Nagada culture (native to Upper Egypt) to the south and the north seems to have been motivated at the outset by the search for metals: gold from Nubia and copper from Palestine; this expansion occurred during the Nagada IIc–d phases (3500–3300/3200), and then Nagada III (3300/3200–3100). During the latter period, competition between the first country-states led to the formation of a unified kingdom.

Around 3100 BCE, climatic changes brought about movements of populations in Asia, a disaggregation of the Mesopotamian system and a restructuring of exchange networks.[16] Migrations affected the Caucasus, Anatolia, and northwestern Iran, and

[14] This accumulation of knowledge had crucial consequences. "The most important changes," Algaze points out (following Myrdal 1970), "were the creation of economies of scale in production and an increase in the rate of innovation as a result of the expansion of knowledge" (2008: 37–38).

[15] For a comparison between Mesopotamia and Egypt, see Ekholm and Friedman 1993: 64–65; Baines and Yoffee 1998. The term "pharaoh" (from the Egyptian *pr-ʿ3*, "large domain") was used at a later period, from Akhenaton.

[16] In northern China, the Hongshan culture collapsed around 3000 BCE (Liu and Chen 2012: 169; cf. also Schettler *et al.* 2006). W. J. Burroughs (2001: 235) considers that the period *c.* 2900 BCE corresponds to a rise in El Niño–Southern Oscillation (ENSO) phenomena. M. Staubwasser and H. Weiss (2006: 379)

we observe the abandonment of the Urukian "colonies." Relations between Egypt and Mesopotamia nearly ceased *c.* 3100/3000. The links between southern Mesopotamia and the northern and eastern regions weakened. The exchanges involving southern Mesopotamia were reoriented toward the Persian Gulf, where intensive exploitation of copper was beginning in Oman. They were probably accompanied by an improvement in seafaring techniques. East of Sumer, the Susian plain was depopulated, but the city of Anshan, in the Fars region, became the center of an independent Elamite state, whose formation appears linked to a rise in exchanges between Sistan, Afghanistan, and the Indus. Trade routes extended further to Turkmenistan and Tajikistan. This Proto-Elamite space disintegrated around 2800 BCE during an arid phase that affected the Iranian plateau and Mesopotamia. At this time, Susiana was again under the influence of the Sumerian space, divided between competing city-states.

During the twenty-eighth/twenty-seventh century BCE, new links were forged between Anatolia, the Levant, and northern and southern Mesopotamia, prompting the rise of the cities of Mari and Ebla (Syria). However, the area experiencing major changes was in fact much larger. From 2600 BCE, urban expansion – with a rise in the number and size of towns and cities – took place, along with advances in agriculture, crafts, and trade, in Mesopotamia, Iran, Central Asia, and the Indus valley. One notes the spread of the Mesopotamian city-state culture. Written documents (tablets) have sometimes been discovered in these cities, for example at Ur, Shuruppak, Girsu (Telloh), and Ebla. Many temples were built, and this provided a firm ideological basis for the political power in place and played an important role in the cities' economy. The institution of kingship emerged against the background of fierce competition (both peaceful and violent) north of Sumer (Yoffee 1995a; Hudson 1996). Kish seems to have played a particular role (it may have been an early seat of kingship), as did a confederation of southern cities, of which Nippur constituted a religious pole. We can observe attempts by some cities to form country-states, through conquests or alliances.

While a royal ideology was emerging, relations between the temples and political power appear to have been complementary, but also at times conflictual. An incipient process of land privatization was initiated by the king, starting in the north of Sumer: it began at the top of the social pyramid. It was fueled partly by the development of the practices of interest-bearing loans and debt. Texts point to land sales in the north of Sumer as early as the Fara period (2600–2450) (Liverani 2014: 101). The concept of equivalence in value was present during this period,[17] as well as the practice of measuring working time and the use of hired workers, with silver and barley used as currency. Historians have often claimed in the past that the state completely controlled production and exchanges and instituted a system of redistribution. Writing, however, was not confined to the great public institutions,[18] although it represented, for these

have identified the period *c.* 3200 as a phase of aridification between the Zagros and Syria and in Anatolia, as well as of a probable weakening of the Indian Ocean monsoon system (the effects are noticeable in Oman and on Mount Kilimanjaro).

[17] In fact, as M. Aubet notes: "The notion of a measurement of value has been present since writing originated" (2013: 148).

[18] Tablets have been discovered in residential buildings that were neither temples nor palaces at Shuruppak (pre-Akkadian), Abu Salabikh (Early Dynastic), and Asmar (Akkadian period).

institutions, an efficient administrative tool and a powerful means of control. A private sector did indeed exist, although its importance remains difficult to evaluate.

This period saw the development of bronze metallurgy, for the production of weapons, tools, and prestige objects. This metallurgy stimulated a growth in trade, through the Persian Gulf and the land routes across Afghanistan and Iran (Boroffka *et al.* 2002).

There was a turning point in exchanges and political developments in the whole of western Asia around 2600/2500 BCE, when interconnections were established between Mesopotamia and the Indus valley, where the Harappan culture flourished.[19] Exchange networks connected these two regions, through the land routes of Iran, and more importantly via the maritime routes passing through Oman and Dharan or Bahrain, regions respectively called Magan and Dilmun in the Sumerian texts. Along these routes, prestige goods, metals, textiles, food products, plants, and animals were transported. These networks made up a new space including, for the first time, the whole of the Persian Gulf, Sind, and the northwest of the Indian peninsula, Turkmenistan, Margiana, and Bactria.[20]

The speed of urban development in the Indus valley has often been pointed out, marked by the appearance of elaborate public architecture, the standardization of weights and measures, the creation of a form of writing (which remains undeciphered), and the growth of export-oriented production (beads and probably cotton textiles). The political power structure and the ways in which production and exchanges were organized, however, remain largely unknown.

On the Mesopotamian side, the port city of Ur benefited from the expansion of trade in the Persian Gulf, as evidenced by the wealth of the "royal" tombs in its cemetery, which yielded a profusion of lapis lazuli and carnelian artifacts from the Indus region. The presence in this cemetery of carts drawn by oxen evokes the great kurgans of the Caucasus and reveals land-based exchanges with Transcaucasia.

The networks extended as far as the Aegean Sea and the Dardanelles Straits. Tin bronze appeared at Troy II, Besiktepe, Thermi, Poliochni, and other sites from 2600/2500 BCE. In central Europe, tin bronze was present in Hungary *c.* 2500 BCE, coming from Troy and through the Danube valley (O'Shea 1992).[21] Whereas for these sites the study of copper or arsenical copper objects dating from earlier periods reveals that the ores employed were of Anatolian origin, the analysis of lead isotopes shows another origin for the tin bronzes. The ores originated rather from Uzbekistan, Tajikistan, the Altai, northwestern lndia or Afghanistan: the development of tin bronze production "coincided with the introduction of new sources of raw material, of tin and, most likely,

[19] Kohl (1989), however, considers that the economic developments of the Bronze Age do not represent connected phenomena. The atlas *The Times Archaeology of the World* also writes, about Mesopotamia, Egypt, and Indus, that "each civilisation must be seen as an independent growth" (Scarre 2000: 122). The same claim can be found in McClellan III and Dorn 1999: 32.

[20] Bactria was located in the region of the Middle Amu Darya valley. Margiana is the ancient name for the region of the delta of the Tedjen and Murghab rivers in Turkmenistan.

[21] On the importance of Troy as a node between various areas, see Easton *et al.* 2002: 101ff. Troy probably exported part of an extensive textile production.

also of copper" (Pernicka *et al.* 2003: 163);[22] these analyses thus shed light on the importance of the routes of Inner Asia, along which lapis lazuli and carnelian were also carried. The discovery of a cylinder seal made of ivory at Poliochni and the fact that the weights at Troy and at Poliochni follow a sexagesimal system similar to that of Mesopotamia[23] also reveal the links between the Aegean area and the Levant and Mesopotamia.[24] In the Mediterranean region, the appearance of bronze in the Aegean world – from Anatolia – occurred at the time of the rise of this region, also based on the cultivation of olive trees and grapevines. Around the middle of the third millennium, vineyards extended over the whole Mediterranean area.

The formation of this vast space initiated a new phase of political integration, which was based on kingship by divine right: by gaining the upper hand over the other Sumerian city-states, Akkad (Agade) became the first-ever known empire (2340–2200 BCE). It took direct control of the land networks that brought metals, wood, and slaves to Mesopotamia. The increasing importance of Ebla,[25] Mari, and the Elamite states may have encouraged this Akkadian momentum. Economic growth was based on the development of irrigation, bronze metallurgy, and long-distance trade. The Akkadian Empire exported mostly agricultural products and manufactured goods. For Mesopotamia, and later for the other "cores," textile exports, as we will see, were crucial to the building of regional and transregional chains of dominance. The rise of sheep herding, promoted and controlled by the state for textile production, provided a basis for the development of this activity – perhaps as early as the Urukian period (McCorriston 1997: 521, 534; Kohl 2007: 222).

[22] The mine at Mushiston, Tajikistan (east of Samarkand), contains a natural blend of copper and tin. In theory, it could be at the origin of part of the tin carried to the west; the mine at Karnab (west of Samarkand, Uzbekistan) is another potential source (Pernicka *et al.* 2003; Cierny *et al.* 2005). Evidence, however, is still lacking for the exploitation of these mines during the third millennium. The discovery of an object made of lapis lazuli at Troy (end of the third millennium) strengthens the case for a Central Asian origin of the ores that were exploited; they may have come partly via northern routes even though the routes following the Indus and the Persian Gulf were certainly the most active. Warburton (2003: 143) is obviously wrong when he claims that Anatolia was cut off from the Mesopotamian and Iranian exchange networks during the third millennium. Contacts were only temporarily interrupted, after the collapse or reconfiguring of the Uruk system.

[23] Tin bronze found at Velika Gruda, in the Adriatic, a site dated to the first half of the third millennium BCE, has been compared to pieces from Troy, Behik Tepe (near Troy), Poliochni, and Thermi (Primas 2002, 2007). The tin for these pieces may have come from Central Asia (Pernicka *et al.* 2003). The copper–gold–silver alloy found at the neighboring site of Mala Gruda may also have come from the Aegean world. Silver was exploited as early as the fourth millennium in eastern Anatolia and in Troas, then at Siphnos (Cyclades) and in Laurion (Attica) (Wagner *et al.* 1980). "The knowledge and impetus for silver production in the Aegean Sea came" from Anatolia and the Levant (Pernicka *et al.* 2003: 167). The use of tin bronze spread into Europe from the end of the third millennium, into Spain, Great Britain, and Central Europe (Primas 2002; Kristiansen and Larsson 2005: 112).

[24] An exchange network of prestige goods operated in the Creto-Cycladic area, including western Anatolia and continental Greece; for Persson (2005), this network seems to have collapsed for internal reasons before the turmoil occurring around 2200 BCE. The network extended to the western Mediterranean Sea. It is unfortunate that Persson, in his analysis, does not take into account the fact that some goods are invisible in archaeological layers; these goods, textiles, and weapons, imported from centers such as Crete, and slaves, who came from the peripheries, may have played a crucial role in the construction of the network (cf. Branigan 1970; Ekholm Friedman 2005).

[25] Ebla, however, was destroyed – probably by Mari – prior to Sargon's expansion (see Liverani 2014: 123).

Between Mesopotamia and the Indus, several regions were active in these exchanges. Oman was foremost, thanks to its copper resources. While this region probably did not form a true state, the finds of seals reflect an organized trade. In addition, from 2300 BCE, Oman produced chlorite vessels termed "*série récente*" (showing a "dot in circle" decorative motif); these are found across the entire Persian Gulf, the Indus, and as far afield as Margiana. West of Oman, an urban center on the island of Tarut, was – along with settlements on the Arab coast facing the island – the first Dilmun of the Mesopotamian texts. The city of Qala'at al-Baḥrayn (on Bahrain) then grew in importance from 2100 BCE (Crawford 1998). On the other side of the Persian Gulf, the region of Kerman may correspond to the mysterious kingdoms of Aratta or Marhashi (also rendered as Barhashi) mentioned in the Mesopotamian texts. A major urban site has been discovered at Konar Sandal, south of Jiroft, that yielded inscriptions revealing unknown scripts, one of them perhaps the ancestor of the Linear Elamite (Basello 2006).

South of the Indian Sea, exchange networks exporting incense extended along the Arab coasts, and probably part of the African coast, maybe even to East Africa if a pendant unearthed in a tomb near Baghdad, dated to 2500–2400 BCE, turns out to have been made of copal, a resin from the region of Zanzibar.

For the Persian Gulf, archaeology attests not only to contacts between the different countries mentioned, but also to the existence of their own common culture, and the probable settling, in Oman, Bahrain, and Mesopotamia, of communities of craftsmen and merchants from the Indus and other regions. The growth of long-distance exchanges is reflected in the existence of shared beliefs and the extension of syncretisms, as shown by the chlorite vessels of the "intercultural" style, which seem to originate mainly from the region of Konar Sandal (Jiroft), in southern Iran. Some seals also show cultural "hybridization." Pottery and body ornaments provide other evidence for the development of a common culture.

Archaeology and texts also provide crucial information about the ships used in the Persian Gulf and the Sea of India during the second half of the third millennium – these were ships with sewn planks, or reed boats, caulked using bitumen, a substance imported from Iran or Mesopotamia.

It is likely that during these early periods, the organization of long-distance trade on a regular and significant basis (shipbuilding, organizing caravans, funding, and so on) often exceeded the means of private merchants. A private sector, however, coexisted – in a quasi-symbiotic way – with the sectors of the palace and the temple. "The public institutions were the loci through which individual 'entrepreneurs' operated within the temple and palace hierarchies" (Hudson 2004c: 104). Unlike what has often been claimed, during the third and second millennia, the state probably never completely controlled the exchange networks, and long-distance trade was not based solely on prestige goods,[26] even though the overall picture, for the third millennium at least, is that of administered economies, with the development of writing permitting a better organization of production and exchanges, "forward planning and economic cost

[26] Ray 2003: 5, 82; Silver 1995. Possehl (2002a: 218) seems to underestimate the importance in trade of basic commodities such as agricultural or raw textile products (wool from Mesopotamia, cotton from the Indus), wood, and dried fish.

rationalization" (Hudson 2004a: 9). The appearance of interest on debts and commercial loans – silver playing a major role here – may have originated in the public institutions (temple and palace) (Hudson 2002), but the private sector was certainly involved in practices that can be observed early on: documents reveal the existence of loans with interest at Girsu as early as the Pre-Sargonic period. Contradicting Hudson, Van de Mieroop (2002) instead places the origin of the loan within the sphere of production. It is noteworthy that "the ancient world provides scant empirical evidence of directly productive loans" (Hudson 2002: 18). Some authors wrongly speak of a "market economy" during the third millennium, although it did not dominate the economic picture (Powell 1977); it would be more accurate to speak of "society with markets" (see below). There was, at least, coexistence of a state sphere and a private sector, the latter partly emerging from within the royal sector (Hudson 1996).

The networks of Inner Asia seem suddenly to have disintegrated or been restructured from 2300 to 2200 BCE, a period of turmoil in Mesopotamia that can be correlated with movements of Indo-European populations from the Balkans to Anatolia, and the possible arrival of Indo-Europeans in the Bactria–Margiana Complex (Bactrian–Margian Archaeological Complex [BMAC]) around 2100 BCE in Central Asia, and later around 2000 BCE in the Highlands, dominating the region of the Indus culture. Domesticated in the steppes during the fourth millennium, the horse was introduced in western Asia at this time. We do not know to what extent these new populations contributed to the destruction of the cities of Poliochni and Troy II observed *c.* 2300 BCE.[27] The Akkadian Empire disappeared around 2200 BCE, a demise precipitated by Guti invasions out of northern Mesopotamia.

These population movements seem to be linked to a sudden major climatic change, with significantly lower temperatures around 2200 BCE. These climatic conditions lasted – with some oscillations – until *c.* 1900, and were accompanied by aridization processes that affected northern Mesopotamia, Syria, southern Europe, Iran, and part of the Central Asian steppes around 2200 BCE (Courty *et al.* 1995; Cullen *et al.* 2000; deMenocal 2001).[28] Cities in Turkmenistan appear to have declined during this period. Aridization led to different processes of adaptation, with growing mobility of herders in the steppes, and intensification of irrigated agriculture in the oases of Margiana–Bactria and perhaps in Xinjiang (Sin-Kiang) (Hiebert 2000).[29] The rise

[27] Tarsus, in Cilicia, was also burnt in this period, while southeastern Anatolia was occupied by populations coming from the east (Joukowsky 1996: 172). Double-spiral-headed pins appeared at Troy around 2300 BCE; we find these pins later in the BMAC culture (this motif, connected to women and maternity, spread to various regions while possibly retaining the same meaning).

[28] deMenocal (2001: 669) connects the collapse of the Akkadian Empire to the growing aridization observed in Mesopotamia and the gulf of Oman around 2100 BCE.

[29] Hiebert (2000) notes a pronounced aridification around 2200 in the steppes between the Aral Sea and the north of the Crimea, this arid phase continuing until *c.* 1800 (a slower and less pronounced process of aridification may have begun in fact as early as 2500 BCE). Based on dendrochronology from Irish oaks (Baillie 1995), M. Mitchiner (2004: 77) has placed the climatic deterioration as early as 2350 BCE. He stresses that it seems to have been related to an aridification of the steppes between Ukraine and Kazakhstan, and to lower Nile flood levels. Mitchiner evokes as possible causes increased volcanism and/or the impact of a comet, but those events had relatively short-term effects. Indeed, in 2354 BCE, the explosion of the Hekla volcano (Iceland) seems to have had a global impact (Burroughs 2001). For long-term effects, it is more relevant to consider the phases of solar activity and the cycles of the ENSO events.

of the Bactria–Margiana complex, whose aristocracy was perhaps Proto-Aryan, was also founded in crafts and in partial military control of the trade roads. The movements of various groups would, slightly later, be facilitated by the development of the war chariot, borrowed from the Arkaim-Sintashta culture of the Urals. The spread of this chariot was spectacular during the early second millennium in the Eurasian steppes, western Asia, and western Europe. Its extended use went hand in hand with that of new types of weapons and the appearance of warrior aristocracies (Kristiansen 2007: 156). Aridification also affected the Arab peninsula, leading to population movements toward Bahrain during the last centuries of the third millennium, and toward Mesopotamia (Glassner 2002b: 358; Parker *et al.* 2006). Indeed, the changes were global, since they encompassed all of the Indian Ocean (Egypt was indirectly affected),[30] as well as China. Staubwasser and Weiss (2006) bring to light an arid phase that lasted 300 years, from around 2200 to 1900,[31] and Wang *et al.* (2005) also identify a weakening of the Asian summer monsoon between 2400 and 1900 BCE, correlated with low solar activity.

The reign of the Third Dynasty of Ur (2112–2004 BCE) (MC), however, marked a Sumerian revival, which may have been favored by a temporary improvement in climatic conditions as well as a more active maritime trade in the Persian Gulf. A centralized administration partly controlled production and exchanges. The state formed a standing army and a substantial bureaucracy. A private sector, however, coexisted with the state sector. The island of Bahrain (Dilmun) benefited from the trade in the Persian Gulf, and copper extraction remained active in Oman (Magan). Moreover, victorious campaigns in Iran provided the Ur Empire with significant quantities of metals.

The end of the third millennium, however, saw the empire in decline, with the conjunction of various factors such as excessive bureaucracy, decreased agricultural production due to a new phase of aridization and soil salinization, and population movements. An Iranian coalition finally destroyed the city of Ur. The whole of western

It is true, however, that unrest in Egypt began under Pepi II's reign (*c.* 2336–2242 BCE). Data collected by Burroughs clearly indicate (though the author claims otherwise) that the climatic changes did not affect western Asia and Egypt alone; around 2200 BCE, China, America, and Nigeria were equally affected (2001: 251, 253) (see below). Research done by Q.-B. Zhang and R. Hebda (2005) based on dendrochronology (Vancouver region) shows a period of lower precipitation in this region between 2200 and the beginning of the nineteenth century BCE. Indeed, the climate change was global.

[30] According to Butzer (1995: 136), Egypt suffered from low Nile flooding between 2200 and 2000 BCE. The low level of Lake Turkana, in East Africa, between 2250 and 2200 BCE confirms Butzer's proposition. Low Nile flooding corresponds with weak monsoons in South Asia (see below). The analysis of ice cores on Kilimanjaro reveals an abrupt climatic change around 2200–2100 (Thompson *et al.* 2002). For the Indus, see Staubwasser *et al.* 2003, Staubwassser and Weiss 2006. In southwestern Madagascar, one notes an arid phase around 2000 BCE (Burney *et al.* 2004: 31).

[31] Staubwasser and Weiss 2006: 380. The variability of precipitation in the eastern Mediterranean Sea appears to be linked in part to the North Atlantic Oscillation (NAO) index. The Caucasus and southern Russia (Khomutova *et al.* 2007) were affected as well as central and southern China. This global climatic change, observed from the twenty-second century BCE, affected a zone ranging from the tropics to the median latitudes; higher latitudes do not seem to have been affected in the same way (Staubwasser and Weiss 2006: 383). Curiously, Bolikhovskaya *et al.* (2004: 215) consider the period 4100–3915 BP as a mild and arid phase in the steppes to the northeast of the Black Sea, whereas lower temperatures are noticeable everywhere during this period.

Asia appears to have been in decline while, farther east, the expansion of the BMAC led to a restructuring of trade networks.

From the end of the fourth to the end of the third millennium, Egypt developed to some extent on its own, following a path different from that of the Mesopotamian "core." Benefiting from the agricultural wealth of the valley of the Nile that flows across the country, and having fewer trade routes with countries abroad, the situation of Egypt, as emphasized, probably favored the emergence of a centralized state, which controlled long-distance trade and production, the latter being stimulated by taxes and demand from the state. Cities formed around administrative and cultural functions that ensured some redistribution of wealth: no city-states ever developed in this context. The importance of the control of production and exchanges by the state, however, is still debated (cf. Warburton 2003). There is little doubt that farmers were owners of their land; texts give evidence of land purchase in the middle and at the end of the third millennium. Texts also show the existence of private trade. Prices were assessed using a monetary standard (copper, gold or silver of a certain weight).

The exchanges mainly operated on a north–south axis, but Egypt enjoyed a privileged position between two seas, the Mediterranean and the Red Sea. Indirect contacts existed with Mesopotamia, through the Levant (the port of Byblos) and the routes linking the latter region and the Nile delta. In addition, land routes (through Nubia and its gold mines) and maritime routes led to Sudan, Arabia, the Horn of Africa, and the legendary land of Punt, the end point of various expeditions by land and sea, the latter benefiting from advances in the rigging of ships during the third millennium. But the role of the Red Sea remained limited: in contrast to the Persian Gulf, this sea became an area of major maritime activity only later, because there was only one core in this region, Egypt, whereas the exchanges in the Persian Gulf had been favored by the existence of two cores, in the Indus valley and Mesopotamia (the importance of Iran should also be taken into account). In addition, Egypt's trade was often carried on through African intermediaries such as Nubia.

Even if Egypt appears to have had weak links with the Persian Gulf, it is striking that the apogee of the Old Kingdom, under the Fourth Dynasty that built the great pyramids, occurred at a time when a globalized space was forming between Mesopotamia and the Indus region. Another parallel is that, soon after the collapse of the Akkadian Empire, Egypt experienced over a century of anarchy, marked by famines ("First Intermediary Period," 2180–2030 BCE), resulting from low Nile flood levels, a phenomenon linked to the global climatic changes from 2200 to 2000 (see above). The weakening of exchanges with western Asia probably accentuated the trend toward political disintegration in Egypt. The entry of populations from Palestine into the Nile delta finally saw the collapse of the Old Kingdom.

In contrast with this global recession at the end of the third millennium, the beginning of the second millennium was a crucial period of transformation and expansion. Unified once again during the Middle Kingdom (*c.* 2030–1730), Egypt set up links with the exchange networks of the eastern Mediterranean Sea, now developing strongly. An urban civilization appeared in Crete (First Palatial Period), which

invented a system of writing.[32] Minoan networks extended into the Aegean Sea, Greece, the Adriatic, and possibly as far as the Black Sea. The pharaohs of the Twelfth Dynasty practiced a policy of expansion into Palestine and Syria, as well as Nubia. Further south, the Nubian kingdom of Kush acted as an intermediary with the African interior. The maritime expeditions of Egypt to the land of Punt (the Horn of Africa, and the coasts of Yemen) went along with growing exchanges in the Red Sea.

In western Asia, weaker political powers after the collapse of the Ur III Empire favored the emergence – on seemingly new terms – of the private sector, which was entrusted with administrative tasks, and the management of agricultural estates and craft workshops; this private sector was able to develop long-distance exchanges, in the Persian Gulf as well as Anatolia. In this region, cities were flourishing during the late third millennium and early second millennium; they may have been the center of macro-states and not proper city-states.[33] Assyrian trading outposts were dotted around Cappadocia. The demand of the Assyrian merchants for tin from Afghanistan or the Samarkand region gave rise to contacts between the BMAC and north Mesopotamia through the roads of northern Iran, with networks expanding toward the Mediterranean.

Farther afield, the invasions at the end of the third millennium opened up contacts between the eastern Mediterranean and Central Europe as of 2000 BCE, on routes that extended as far as Scandinavia and Great Britain (Kristiansen and Larsson 2005), in parallel with the rise of trade in tin, bronze, and amber. Tombs of an elite involved in long-distance contacts have been discovered in southern England, in what has been called the "Wessex culture"; they contain amber artifacts from the Baltic Sea and gold objects from either Armorica or other regions of the continent; this elite probably controlled the tin exports. Elites benefiting from the bronze trade appeared at the same time in Germany and Poland, as shown by tombs found at Leubingen, Helmsdorf, and Lęki Male.

In the steppes of Central Asia, the increasing mobility of herder–farmers of the Andronovo complexes reflects the development of both metallurgical activities and exchange networks, which extended to the Tarim and East Asia.

At the same time, the period from the twentieth to the eighteenth century BCE saw an "explosive dispersion" of the Bactria–Margiana Complex (Hiebert 1994), and the collapse of the Mesopotamia–Persian Gulf–Iran–Indus space with the abandonment of

[32] Several types of writing have been discovered, first the Cretan hieroglyphic and the proto-linear A, then the linear A, presumed to be syllabic and ideographic, in which some authors have seen Luwian influences (Anatolia). These scripts remain undeciphered. Moreover, the Phaistos Disc (*c.* 1700 BCE) exhibits another undeciphered "script." The Minoan economic organization seems to have been centered on the palace, which included warehouses and workshops. There is not much evidence for the militarization of the "state," which was engaged in commercial activities. Crete had contact with Ugarit, Mari, and the first Babylonian dynasty, as well as with the Cyclades and Anatolia. J. Persson (2005) defends the idea of a proto-state rather than a centralized state for this period of the first palaces. For this author, the isolation of Central Crete at the end of the third millennium led to the creation of competing chiefdoms that erected stone buildings; those chiefdoms would mutate under the influence of contacts with western Asia at the beginning of the second millennium. In addition, Bernal (1991) has proposed influences from Egypt.

[33] In fact, "we are virtually ignorant of the political system" of this region during this period (Hansen 2000a: 23).

Indus cities such as Mohenjo-daro around 1900 BCE and a general decline of urban life in Iran. The reasons for this urban collapse in the Indus valley are still debated: aridization of the climate,[34] Indo-European intrusions, ecological imbalances, tectonic movements, and a falling-off in long-distance trade probably had combined effects. It is obvious that during the period *c.* 2000 BCE many regions were affected by a phase of weak monsoons in the Indian Ocean, which led to increasing aridity. Climatic changes also affected the North Atlantic at that time.[35] Around 1800 BCE, contacts between Mesopotamia and the Indus had all but disappeared. Some trade, however, remained on the coasts of Gujarat, and cultivated plants were transported from Africa to India during the first half of the second millennium BCE, probably via southern Arabia. During the key period from the twentieth to the eighteenth century, while commerce flourished in the western gulf during the Isin-Larsa period (with Bahrain playing a significant role), we observe a gradual shift of the main Mesopotamian centers toward the north. The political integration led by Hammurabi (1792–1750) (MC) from Babylon – marked, as in Assyria in the earlier period, by a symbiosis between the state sphere and a rising private sector – is indicative of the changes taking place; however, it linked the spheres of the Mediterranean and the Persian Gulf for a brief period only.

During the eighteenth century BCE, invasions and economic crises affected various regions. Upheavals in Anatolia led to a breakup of relations between Assyria and Cappadocia. Kassites coming from Zagros entered Mesopotamia *c.* 1740 BCE, soon accompanied by Proto-Indian elements. Groups that came from the northeast of the Balkans introduced the spoked wheel chariot into Greece (it was present in the seventeenth century BCE at the time of Grave Circle A at Mycenae, but various sources contributed to this import).[36] The Greek myth of a sun god in a chariot drawn by horses or swans has obvious Nordic origins (Kuzmina 2007: 123). The Middle Kingdom of Egypt disintegrated against a background of social unrest and foreign infiltrations. From 1780 BCE onward, the Hyksos from Canaan entered Lower Egypt and controlled the Nile delta, while in the south, the state of Kush gained the ascendancy. The period of Hyksos domination during the "Second Intermediary Period" of Egypt, however, was not the time of chaos the Egyptian sources depict. It favored the dissemination of innovations (the introduction of horses, the use of the chariot, the rise of bronze metallurgy, and so forth),[37] and transcultural exchanges fostered the major invention of alphabetic writing.

[34] Burroughs (2001: 255) argues that the collapse of the Indus civilization did not coincide with a phase of aridification, but, as already stressed, a large number of sources show lower temperatures from 2200/2100, and processes of aridification both in Mesopotamia and in India, linked for the eastern part of the Persian Gulf and for the Indian Ocean to a weakening of the monsoon system and a decline in solar activity. The Indus civilization must have been weakened by the climatic changes from 2200/2100 onward. Cf. Staubwasser *et al.* 2003, Gupta *et al.* 2005.

[35] Cf. H. M. Cullen *et al.* 2000, for western Asia; L. G. Thompson *et al.* 2002, for East Africa, C.-B. An *et al.* 2005, for northern China; and S. Nadis 2001, for the North Atlantic.

[36] K. Kristiansen (2007: 157) shows the coexistence of three types of cheekpieces in Eurasia, reflecting vast spheres of interaction. These three types are present in the Mycenaean world. Various authors have suggested that the Mycenaean aristocracy originated from the steppes, but this idea is still subject to debate.

[37] For M. Liverani, however, Hyksos' infiltrations "happened well before the arrival of these new techniques" (2014: 237).

In the Mediterranean, the Cretan palaces were destroyed around 1700 BCE, in circumstances that are unclear.[38] The decrease in trade in the Persian Gulf during the late eighteenth and seventeenth centuries BCE went along with transformations in the networks, which in the period 1600–1400 appear to have been organized mainly along an arc spanning Egypt–Levant–northern Mesopotamia–Anatolia–Greece and the Aegean area.

Major changes also occurred in Europe, with new interactions between the continent and the Mediterranean world. During the seventeenth and sixteenth centuries BCE, the time of Grave Circles A and B at Mycenae, contacts grew between the eastern Mediterranean and the Carpathian mountains, a region that exported gold, copper, and perhaps human beings (mercenaries and slaves), and with the Russian steppes, which provided horses. These contacts accompanied a development of Central Europe marked by the rise of metallurgical activities and the building of fortified settlements (Barca, Spissky Stvrtok, Nitriansky Hradok, in the region of the Carpathian mountains) (Otomani culture) as early as the eighteenth century, but more so during the seventeenth and sixteenth centuries BCE (Kristiansen and Larsson 2005: 162). Disc-shaped cheek-pieces bearing ornaments of Mycenaean type are found from the Danube valley to Kazakhstan (Kuzmina 2007: 122). The exchange networks reached the Baltic Sea, a region that traded amber and furs. The Baltic and eastern Europe were connected to a road linking Mongolia, the Transbaikal region, and Europe; that road explains the diffusion of objects related to the Seima-Turbino complex (*c.* 1800–1500 BCE), which expanded from a region in Sayan-Altai (Chernykh 1992; Pydyn 2000: 229; Koryakova and Epimakhov 2007: 108). For Kuzmina (2007: 181), however, the spread of metallurgy and art of the Seima complex was first associated with Fedorovo groups from eastern Kazakhstan and Semirech'e: the Altai represents a secondary center of development. Tin may have come either from the Altai or from central Kazakhstan (Hanks 2014: 1950). The expansion of the Seima-Turbino phenomenon, marked by new technology (the use of thin-sided molds and the lost-wax technique) could be the result either of the establishment of trade networks, or the migration of warrior metallurgists, or both. In Moldavia, the treasure of Borodino shows bronze or jade axes (using jade from the Altai), which traveled via this northern route that Chernykh called the "great tin road." Moreover, the fortified site of Monkodonja, in Istria, in the Adriatic, could be viewed as evidence of a Creto-Aegean expansion to the west (Mycenaean pottery has been

[38] Internal fighting or invasions have been suggested. Moreover, the explosion of the volcano of Thera (Santorini) occurred around 1628 or 1645 BCE (dendrochronology on Irish and Anatolian trees and the analysis of ice cores in Greenland show a phase of cooling in this period; cf. M. Bietak 2003: 23) (a dating to around 1420 BCE, however, had been put forward previously; see, for example D. G. Sullivan 1988, quoted by M. S. Joukowsky 1996: 186). For W. J. Burroughs (2001), an explosion occurred in 1627 BCE, whose effects must have been felt worldwide (lower temperatures …), but it is not certain that this was due to the Santorini volcano. W. Friedrich *et al.* (2006: 548) for their part have placed the Santorini explosion between 1627 and 1600 BCE. C. U. Hammer *et al.* (2003) and H. J. Bruins and J. van der Plicht (2003) favor a date *c.* 1645 BCE. For M. Bietak (2003: 30), curiously, the dating of the eruption of the Santorini volcano in the seventeenth century BCE does not match archaeological data, which would point to the beginning of the Eighteenth Dynasty and not to the Hyksos period; for him, resolving the conundrum by raising the dates of the Eighteenth [Egyptian] Dynasty, however, is "virtually inconceivable, taking into consideration the Assyrian chronology." Bietak's interpretation of the archaeological documents has been refuted by S. W. Manning and C. B. Ramsey 2003: 112–113 n. 7.

discovered at this site). The greater availability of bronze was accompanied by an increased production of various weapons. Everywhere in Europe, a warrior elite was emerging.

These transformations during the intermediary period of the eighteenth century shed light on the configurations of the Late Bronze Age, marked by the new importance of the eastern Mediterranean and northwestern Asia.

During the seventeenth century BCE, the center of gravity of western Asia shifted toward the north, with the relative decline of southern Mesopotamia and the Persian Gulf, despite the creation of a Kassite Empire with Babylon as its capital. A new sphere of interaction developed, centered on the eastern Mediterranean. By the sixteenth century BCE, both trade and military conflicts increased, between the Egyptian New Kingdom, the Hittite Empire (Anatolia), the states of Mitanni (Upper Euphrates),[39] and Assyria (on the Upper Tigris).[40] This Late Bronze Age space appears to have had links to African, Arab, European, and Asian peripheries. From 1600 BCE, a phase of global warming was accompanied in the eastern Mediterranean by increased precipitation that favored agricultural progress in this region. Crete experienced the flourishing of the "second palatial civilization," from *c.* 1700 to 1450, marked by trading relations with the Levant, Anatolia, the Mycenaean world, and Egypt. In the north, a Mycenaean civilization flourished, which gave birth to a new writing system, known as Linear B, transcribing Greek. During the fifteenth century, the Mycenaeans took possession of the Minoan cities[41] and, in search of new sources of metals, extended their networks in the western Mediterranean (Italy, Sicily, Sardinia, the eastern coast of the Iberian peninsula). This space was connected to the Atlantic coasts (the exploitation of tin in Cornwall, begun in the early second millennium BCE, grew during this period), to Central Europe, whence tin probably arrived from the Erzgebirge (Germany), and to northern Europe.[42]

Leading a military and trade expansion, Egypt appears to have had close links to the spheres of western Asia and the eastern Mediterranean, as well as the African and Arab peripheries (Nubia and Punt), through which the exchange networks extended toward India. The Egyptian revival was accompanied by social transformations, with the clergy growing in importance, a transformation of the relationship to the divine world (especially under Akhenaton), and the private sector taking on a greater role in craft and commerce.

In all the great centers of the Late Bronze Age space, crafts benefited from advances in metallurgy – with the appearance of iron – and the glass industry, and there was a marked growth in the manufacture of products destined for export. Multiple

[39] Called Hanigalbat in Assyrian.

[40] The relative gap in our knowledge for the period 1650–1550 BCE corresponds to a phase of (new) state formation (Liverani 2014: 271).

[41] The date traditionally proposed is *c.* 1450 BCE, but this is still debated (see below).

[42] Contacts led to the transfer of objects, people, and ideas. Some stylistic or symbolic parallels proposed by K. Kristiansen and T. B. Larsson (2005) between the Minoan or Mycenaean civilizations and northern Europe for objects, rock paintings, or engravings have been questioned by other authors (e.g. Harding 2006). Folding stools and some figurines (for example, that of Schernen, in Poland), however, clearly reflect eastern-Mediterranean influences or represent imports.

exchanges, in which Cyprus and the Levant played the role of hubs, fostered the development of an "intercultural style" in production. These exchanges involved merchants operating for the state – sometimes also as diplomats – or working on their own: the period of the Late Bronze Age represents an era of "internationalism," as clearly shown by the tablets of El-Amarna sent to the pharaohs Amenhotep III and Akhenaton. Political integration was accompanied by a more efficient organization of the armies, which were making use of horses and chariots.

The interregional equilibrium between the main kingdoms changed during the fourteenth century BCE, when Assyria emerged as a dominant power, wiping out the Mitanni Empire and seizing Babylon in 1234. Moreover, the Egyptian expansion into Palestine and Syria following Thutmose III (*c.* 1479–1425 BCE) led to a major confrontation with the Hittites at Qadesh (Syria) in 1274.

From the thirteenth to the twelfth century, new climatic change played a crucial role in the upheavals affecting the Balkans, western Asia, and Egypt at this time.[43] The Hittite state and the Mycenaean centers were destroyed by population movements that swept over western Asia and the eastern Mediterranean region around 1200 BCE, the "Dorian" invasions in Greece, "Phrygian" invasions in Anatolia, as well as migrations/invasions of the "Sea Peoples" in the Levant and in Egypt. These movements combined with problems internal to both the states and the interconnected area of the Late Bronze Age, and led to the collapse of that entire area. This system of competing imperialist states no doubt formed a fragile edifice, further destabilized by the rise of "interstitial" trade that was taking place beyond the control of those states (Sherratt 2003). There began a long phase of recession, which affected most of the regions until *c.* 1000 BCE. The collapse of the palatial structures led to the disappearance of writing in Greece. Abrupt changes also occurred in the Eurasian steppes, with the adoption of the practice of horseback riding. Indo-European speakers from Central Asia entered Iran and Pakistan. At this time, India no longer seems to have been connected to western Asia, even though some ports probably remained active on the west coast of India.

In the four millennia during which we have followed the development of states and world-economies in western Asia, East Asia experienced its own trajectory, even though – very early on – contacts allowed the transmission of techniques and products between the Occident and the Orient. China represents, as mentioned, another primary center for the domestication of plants and animals, where sedentary communities organized their territory. The development of rice culture in the Yangtze basin from the sixth millennium BCE provided the basis for a demographic expansion that fueled movements of population toward Southeast Asia. Proto-Austronesian speakers settled in Taiwan as early as the end of the fourth millennium BCE. They reached the Philippines during the third millennium, and eastern (then western) Indonesia during

[43] Again, dendrochronology on Irish oaks shows a phase of cooling that was also noted, for a slightly later period, in the Sierra Nevada *c.* 1130 BCE (Mitchiner 2004: 82). For China, in the central plains, at the beginning of the period of the Western Zhou, the climate became drier and cooler than before. These changes were aggravated by a major volcanic eruption in 1159 BCE (Burroughs 2001), perhaps of the Hekla volcano (Iceland). For K. Kristiansen (1998: 384, 410), a drier climate during the thirteenth century BCE in central Europe may have favored agriculture; conversely, the process of aridification affected the Mediterranean Sea world and part of the steppes.

the second millennium (Bellwood 2005a). Moreover, Proto-Austroasiatic speakers migrated toward continental Southeast Asia during the third millennium BCE, bringing cereal cultivation into this region. They were apparently present in part of western Indonesia before the Austronesians, and entered India during the early second millennium BCE (Proto-Munda) (Blench 2010b; some authors have put their arrival at an earlier date, but this has not been confirmed by the most recent data).

The Yellow River represented another early center of agricultural development, with the domestication of several millets. Very early on, one notes interactions between the Yangtze and the Yellow River valleys, with the presence of rice attested in the latter region during the fifth millennium, and the cultivation of *Setaria italica* millet in the Yangtze valley (Lu 2005; Nasu *et al.* 2007; Fuller *et al.* 2007).

The Yangshao culture, which expanded from the middle valley of the Yellow River during the fourth millennium, reveals an incipient increase in social complexity, which can be more clearly observed during the third millennium. The rise of large agricultural communities and the progress of exchange networks led to the formation of hierarchical societies both in the Yellow River basin (Late Dawenkou culture, *c.* 2800–2500, and later the Longshan culture, *c.* 2500–1900 BCE) and the Yangtze River valley (Liangzhu culture in the delta, 3300–2200 BCE, Qujialing and Quinglongquan cultures in the Middle valley, 3000–2000 BCE). The elites inhabited segregated palatial complexes in large settlements such as Liangchengzhen in eastern Shandong, Taosi in South Shaanxi, and Wangchenggang and Guchengzhai in Henan. In the coastal area of southeastern Shandong, the site of Yaowangcheng covered 367 ha, with a four-level settlement hierarchy (Liu and Chen 2012: 217). The elites controlled specialized handicrafts such as ceramics and jade. The wide geographical distribution of jade artifacts of particular shapes reveals long-distance exchanges and shared beliefs. The abundance of weapons recovered bears witness to the climate of violence that went along with the construction of these first important political entities. Bronze seems to have been present in the main centers of the Late Longshan culture.

The process of urbanization developed in a relatively autonomous way, but external influences played a decisive role in the shift from the Neolithic to the Bronze Age in the third millennium; they came via the oasis routes that led to Bactria and the Indus valley, and via routes farther north. Bronze metallurgy first appeared in the Qijia culture (Qinghai, Gansu) (2200–1600 BCE), which benefited from inputs from both the BMAC and the steppes cultures. Contacts allowed the introduction of barley and wheat into China, as early as the first half of the third millennium. Movement also occurred in the other direction from the Yellow River, for the acquisition of jade and metallic objects.

Various Chinese Neolithic cultures disappeared during the early second millennium, following the occurrence of a phase of marked aridity at that time (An *et al.* 2005), and the political entities centered on Taosi and Guchengzhai collapsed.

During the early second millennium, in the Yellow River valley, new elites adopted and monopolized the use of bronze, not only for the manufacture of weapons and tools, but also for the production of ritual vessels used for ancestor worship. An important kingdom was in place from 1800 BCE in the Middle Yellow River basin (Erlitou archaeological phase). Erlitou developed long-distance exchanges and installed "colonies" as far as the area south of the Yangtze valley, which manifested a desire to control the access routes to natural

resources (salt, copper, tin . . .). Travelers probably followed the routes of the Central Asian oases. The communities of Xinjiang and Gansu played the role of interface for contacts between east and west. Gansu and northern China also exhibit influences from the transcultural Seima-Turbino phenomenon (Siberia) (*c.* 1900/1800–1500 BCE?),[44] with forms of weapons and tools that would later be found in Southeast Asia (Higham 1996a).

The arrival of new elites signified the demise of Erlitou. The city of Yanshi emerged near Erlitou, and later a bigger state developed, with the city of Zhenzhou as its center, from 1600 BCE. Probably ruled by the historic Shang dynasty (phase Erligang), this state shows the first signs of a writing system, invented independently from western Asia. The Erligang culture expressed more pronounced expansionist tendencies than those of the Erlitou state, along with the same desire to control resources and trade routes. First the capital, then the regional centers held a monopoly on the production of bronze vessels associated with the royal ancestor cult. The assemblages that have been found in the tombs reveal contacts with southern regions (Lingnan), whence came pearls, turtle shells, and cowrie shells, which would be used as currency in the Late Shang phase.

The end of the fifteenth century BCE was a period of transformation and restructuring marked by the abandonment of sites in the west and the shift of the Shang capital to Huanbei (Anyang), then to Yinxu (Anyang). The urbanization of China increased at this time, as well as its social complexity.[45] Silk weaving – known as early as the fourth millennium BCE – developed, alongside an expansion in trade. Exchanges grew, especially with Sichuan, the Yangtze valley, and regions further south. In addition, the rise of regional cultures at Wucheng (Jiangxi) and Sanxingdui (Sichuan) points to local development, and to increasing long-distance trade toward Southeast Asia and South Asia; this may explain the transfer of copperworking and bronzeworking to Lingnan, as well as to the basins of the Mekong, the Red River, the Chao Phraya, and Upper Burma, along age-old roads.

Contacts continued with Inner Asia via the oases routes and the northern steppes, whence, during the thirteenth century BCE, jade arrived from Khotan and also horse-drawn chariots, which were placed in the royal tombs of Anyang. Iranian speakers may have arrived in Xinjiang. Exchanges transformed the cultures that were in contact with the Yellow River basin. A military elite emerged in the "Northern Complex," north of China (Di Cosmo 2002). The rise of nomadic populations and a deterioration in climate led at last to a disaggregation of the Shang state at the end of the second millennium BCE, and the Zhou dynasty, at the head of a state previously vassal to the Shang, in Shaanxi, came to prominence in 1027 BCE.

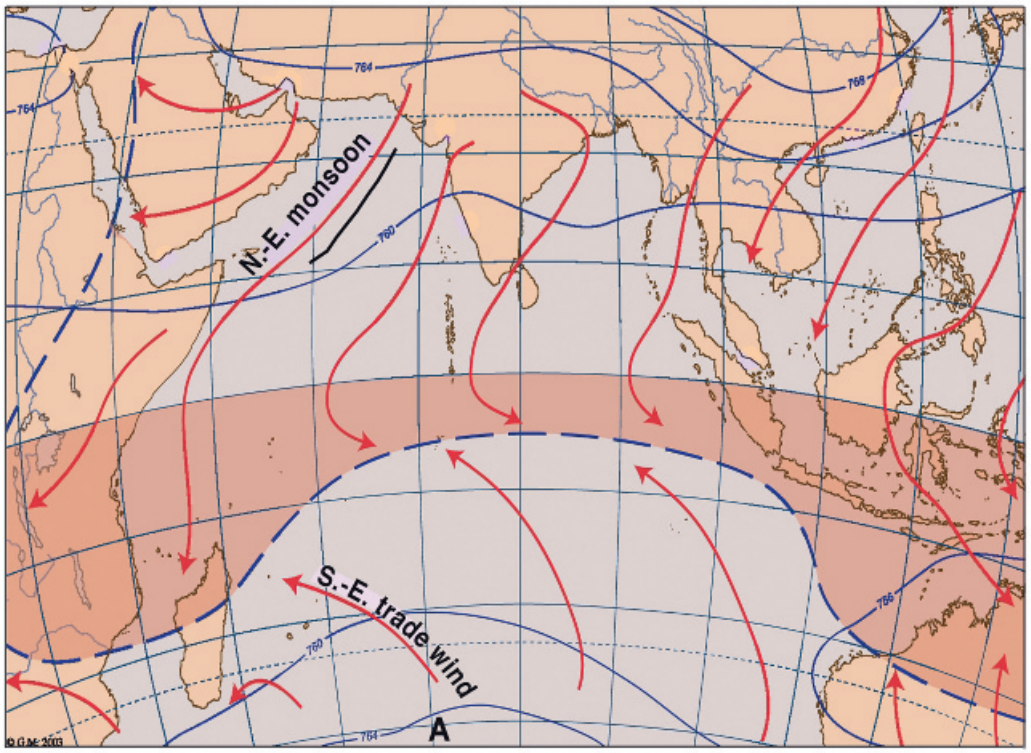
For the Ancient World, available data show the existence of two large areas (western Asia–Egypt–the Mediterranean, and East Asia), with only weak connections during the second millennium. A comparison of the evolution of the number and size of towns allows us to assess the interactions between regions and the local dynamics. Urban development followed general demographic trends and the economic expansion (or decline) of regions structured by geographical and human factors, and of the various

[44] Datings "suggest that the Seima-Turbino sites lie within the 22nd to 17th century BC range (Chernykh 2009)" (Higham *et al.* 2011).

[45] The first sizeable city identified by T. Chandler (1987) is Ao, a Shang capital in the Yellow River valley, *c.* 1360 BCE, but other cities have been discovered since the publication of that book.

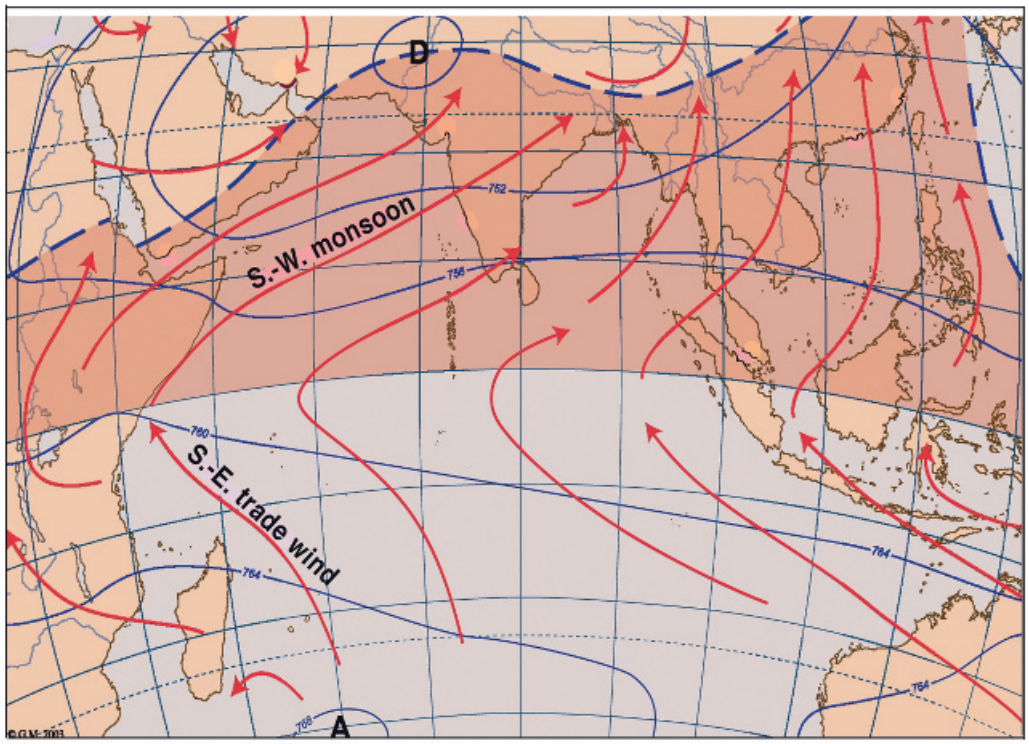
Map In.1 Wind systems in the Indian Ocean: January and July

January



A D high and low pressure centers

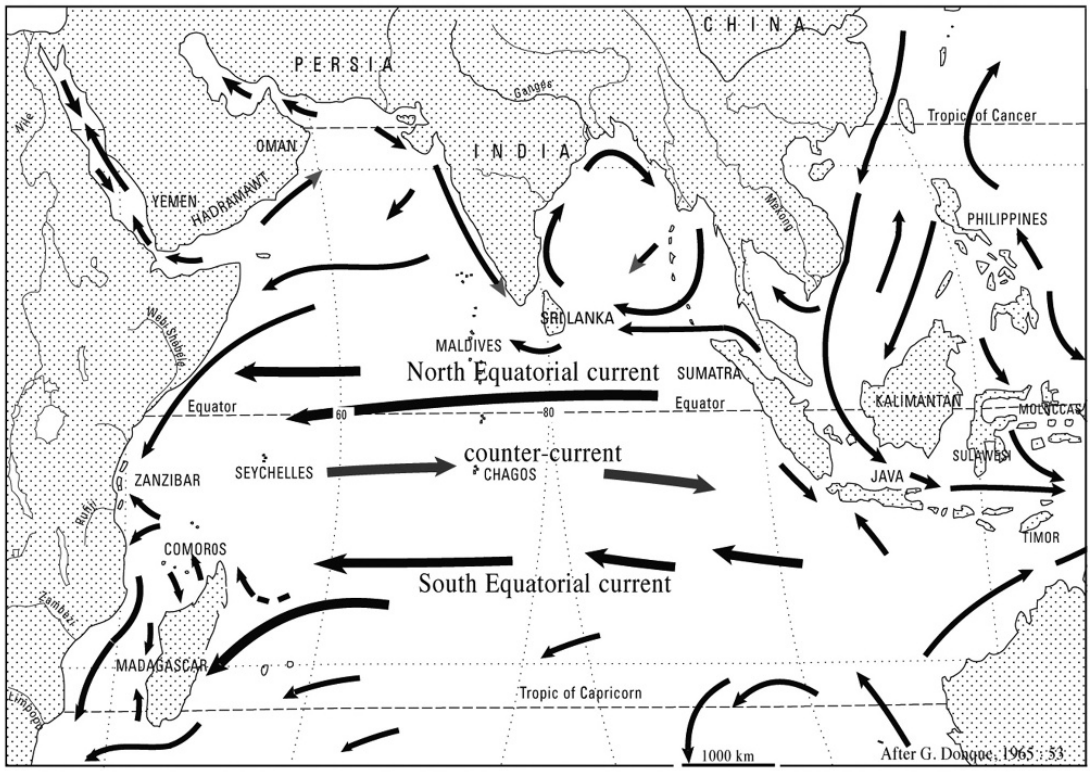
July



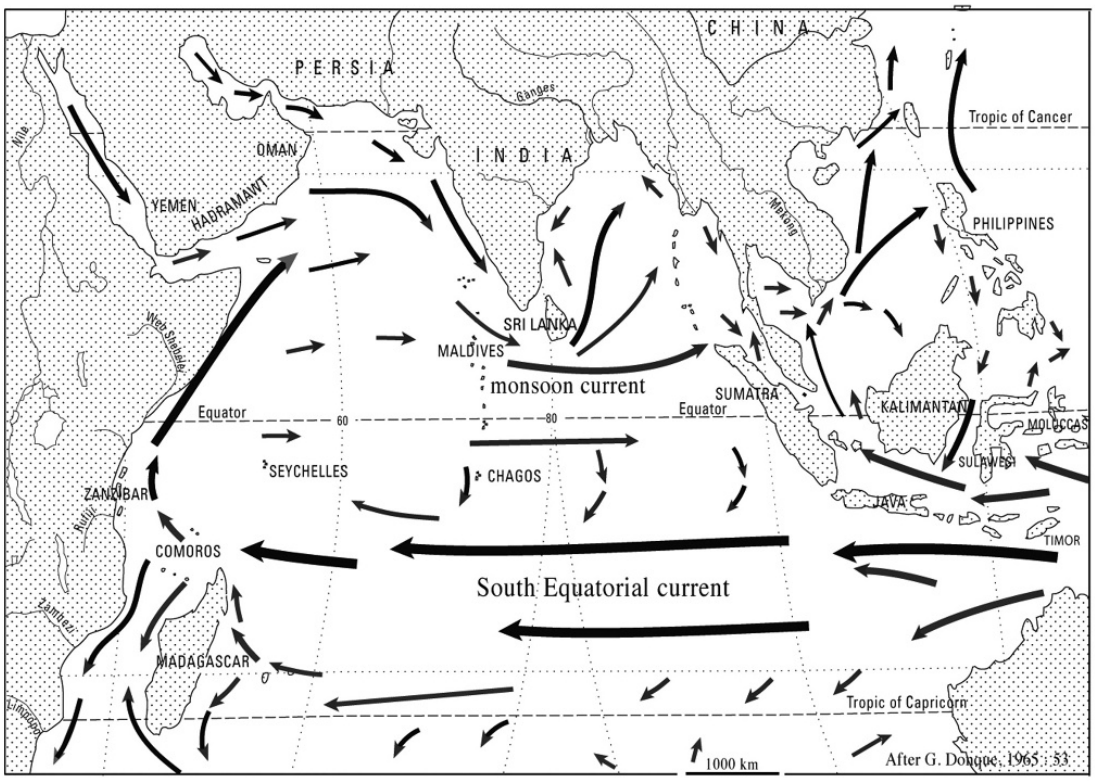
A D high and low pressure centers

Map In.2 Surface currents in the Indian Ocean: February–March and August–September

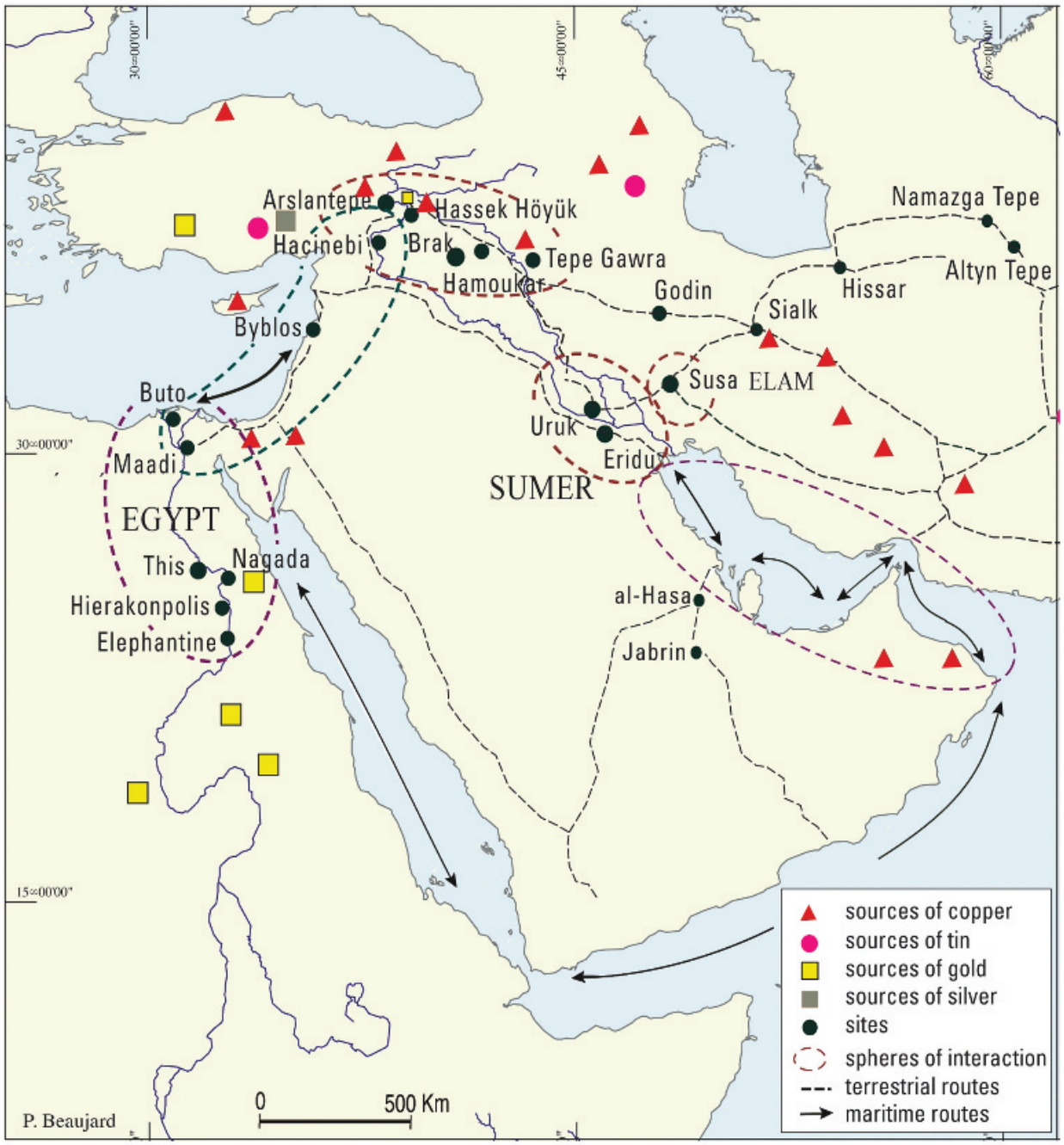
February–March



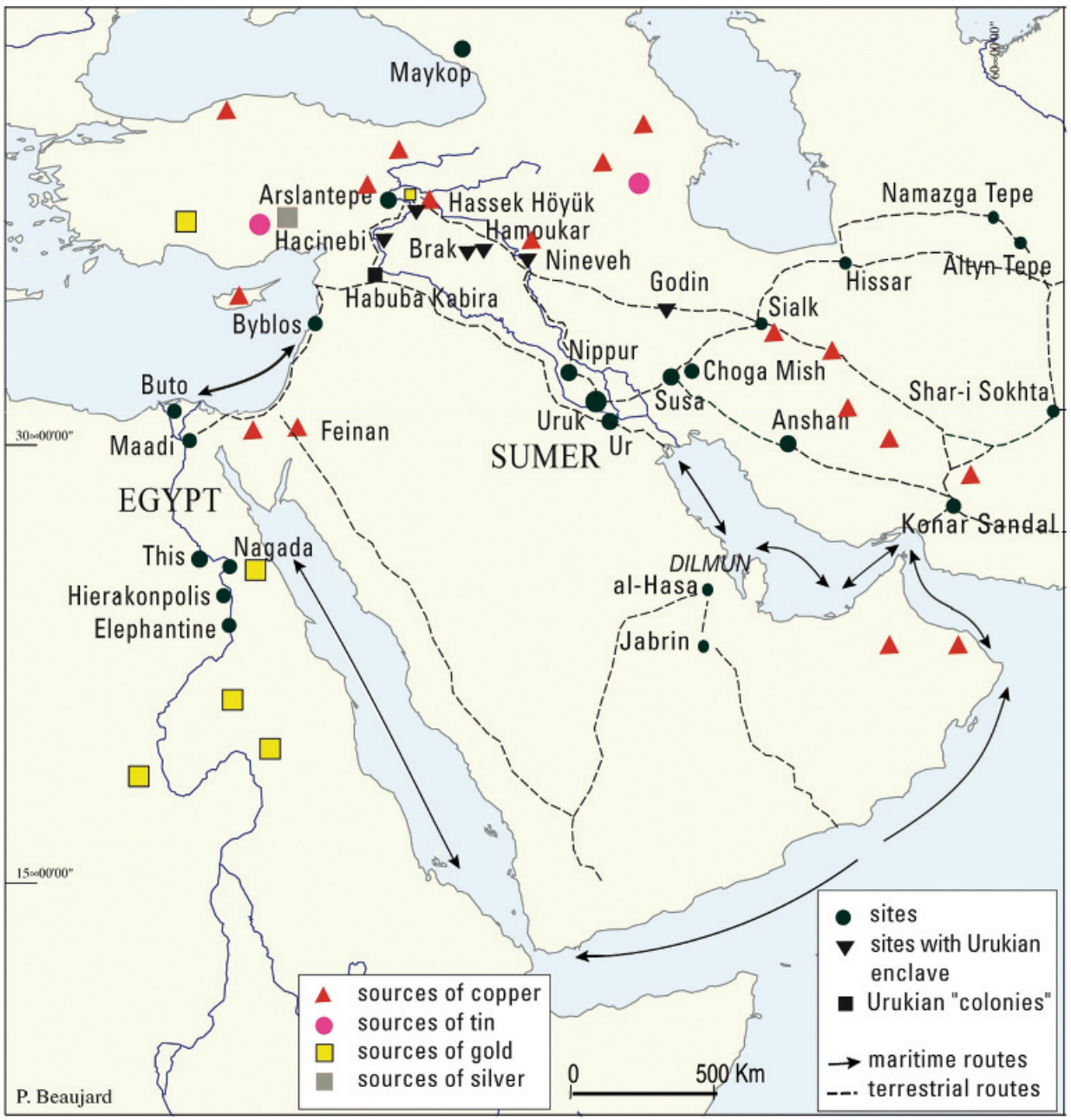
August–September



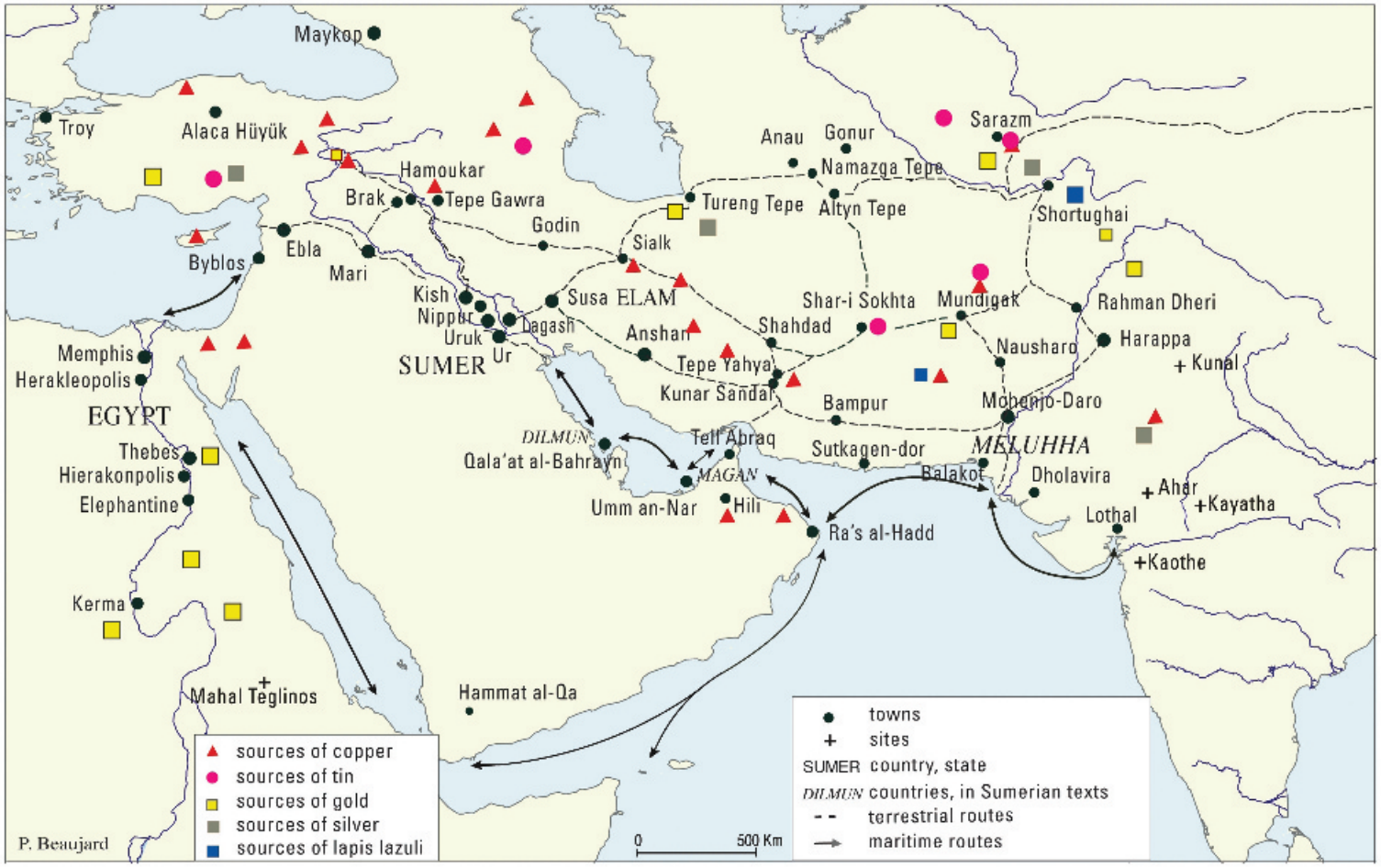
Map 1.1 Western Asia and Egypt 4000–3500 BCE



Map 1.2 Western Asia and Egypt 3500–3000 BCE



Map 1.3 Western Eurasia and Africa during the third millennium BCE



Map 1.4 Artifacts showing contacts between Egypt and Mesopotamia during the fourth millennium BCE

P. Beaujard, partly after P. R. S. Moorey 1995: 192

Map 1.5 Egypt during the third and second millennia BCE

P. Beaujard, based on P. L. Shinnie 1991: 52, J. Phillips 1997: 424, and K. A. Kitchen 2002: 387

Map 1.6 Western Eurasia and Africa during the second millennium BCE

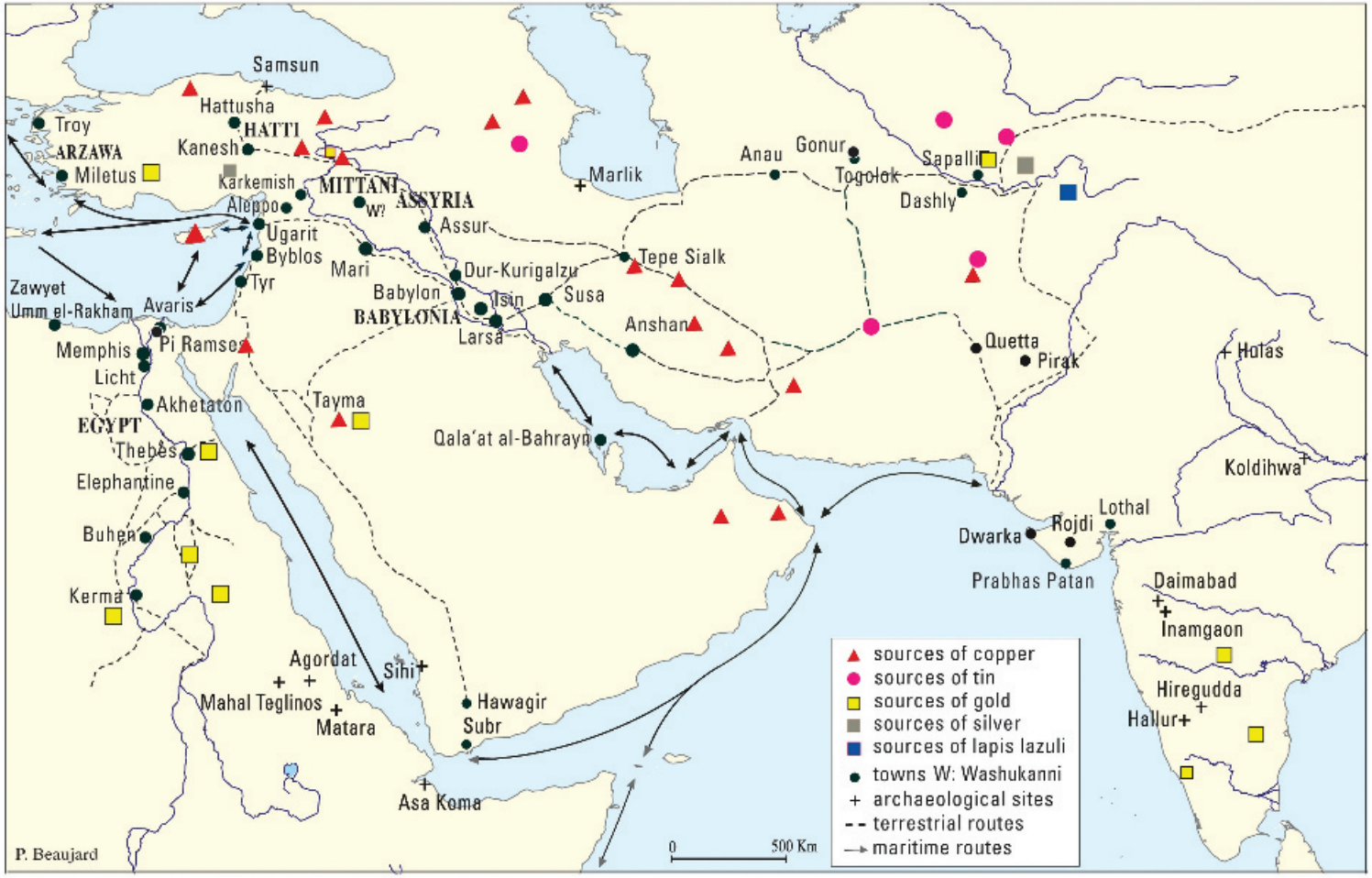


Table I.In.1 *The number of cities with more than 25,000 inhabitants, 2250–1000 BCE, according to Chandler (1987) and Bosworth (1995: 212)*

Years BCE	Mesopotamia	Egypt	Levant	Mediterranean	Anatolia	India	China
2250	4	3	1	0	0	0	0
2000	6	3	0	0	0	0	0
1800	3	5	0	0	0	1	0
1600	3	3	1	2	1	0	0
1360	5	4	1	3	2	0	1
1200	5	3	0	2	1	1	2
1000	4	4	1	0	0	1	3

exchange networks. This development was accompanied by flows of populations between the countryside and the cities, and the outbreak of epidemics, generated by the urban phenomenon (McNeill 1998b). Chandler attempted to estimate the size of the urban population from 2250 BCE onward in the largest cities.[46] Because of the fragmentary nature of our knowledge[47] of ancient times, this estimate can only be a questionable approximation. The number of cities reviewed, however, gives some clues about the overall transformations in Afro-Eurasia (see Table In.1).

In the west, Mesopotamia and Egypt represent the centers of areas in which the number of towns varies upwards and downwards – sometimes in opposite directions. A peak in urbanization is seen during the fourteenth/thirteenth centuries BCE, before the collapse at the end of the millennium.

The great poles of civilization fostered the rise of some peripheral regions that benefited from particular assets. Advances in agriculture and exchanges during the third millennium thus encouraged the emergence of complex societies in Arabia, first on the shores of the Persian Gulf (see above), and to a lesser extent on the western side of the peninsula. A bronze culture developed in the Highlands of Yemen during the second half of the third millennium, and proto-urban centers appeared. During the second millennium, whereas the Persian Gulf was in decline, exchanges were increasing in the Red Sea, stimulated by the Egyptian trade with Punt. The Late Bronze Age saw the flowering of the Subr culture on the Yemeni coasts, while the domestication of the dromedary facilitated the organization of caravans toward the Levant.

At the other end of Asia, the contacts of Southeast Asia with southern China and with India were still limited during the third millennium. We know that rice cultivation was introduced by Austroasiatic speakers from a region south of the Yangtze into Thailand and later into the Ganges valley, but not before the end of the third millennium for Thailand and, during the second millennium, in the case of India. During the second millennium, the introduction of copper and bronze metallurgy into continental

[46] Estimates have been done for every 150–200 years until 1000 CE and then every 50 years, until 1800. These estimates were revised by G. Modelski (2003) and I. Morris (2013).

[47] Thus, for the Shang culture (China), texts give about one thousand names of towns and cities, only some of which have been discovered. Moreover, the size of a town or city depends on its pattern of urbanization. Also, the size of the towns imperfectly reflects the dynamics of regions characterized by political decentralization.

Southeast Asia triggered major social transformations, along with a rise in exchanges. No proper urban center can be observed for these ancient periods, however. Despite interconnections between central China, Lingnan, Yunnan, northern Vietnam, Cambodia, and Thailand, and the appearance of local exchange networks in Thailand and in Malaysia, for example, it is difficult to interpret the available data as showing the formation of an integrated area including the whole of East Asia. South Asia (India and Pakistan) and China represent structurally separate spaces, even though links existed between Yunnan, Upper Burma, and Assam, and exchanges developed through Central Asia, seen notably in the introduction of *Panicum miliaceum* millet and rice of the *japonica* type into Pakistan during the early second millennium. Evidence for maritime contacts between Southeast Asia and India during the third and second millennia is marginal. No expansion comparable to that of the Austronesian Lapita culture into the

Table I.In.2 *Comparative chronologies (sixth–third millennium BCE): western Asia, Persian Gulf, and eastern Mediterranean; Egypt and Red Sea, western Arabia; India and Central Asia*

Western Asia, Persian Gulf, and eastern Mediterranean	Egypt and Red Sea, western Arabia	India and Central Asia
c. 6000–4500: 'Ubaid culture	*4400–3800:* Badarian culture	
4600: founding of Uruk?		
4150–3800: Early Uruk	*4000–3600:* cultures of Maadi and Buto (delta), of Nagada I (Upper Eg.), and of "A-group" (Nubia)	*3500–3100:* Namazga II phase in Turkmenistan and in Margiana
3800–3400: Middle Uruk		*3200–2600:* Early Harappan (Indus)
3400–3150: Late Uruk; Urukian expansion into Syria and into Iran; innovation of bronze metallurgy	*3500–3300:* Nagada IIc–d: expansion into the delta	*3100–2700:* Namazga III phase in Turkmenistan and in Margiana
3300?: first writing signs at Uruk	*3300/3200:* formation of hieroglyphic script	
	3300/3200–3100: Nagada III, "Dynasty 0" of Abydos; unification of Egypt under Narmer	
3100: collapse of the Urukian "colonies"; Proto-Elamite state (*3100–2800*) and writing	*3100–2700:* Thinite period (first–second dynasties)	
3000–2340: Sumerian city-states. First Dynasty of Ur	*2700–2180:* Old Kingdom (Third – Sixth Dyn.)	*2600–2000:* Classical Harappan
c. 2500–2350: contacts with Bahrain, Oman, and Indus valley	*2600–:* construction of the great pyramids under the Fourth Dynasty	*2500–2200:* Namazga V phase (Turkmenistan–Margiana–Bactria)
2340: Sargon established the Akkadian Empire, which lasted until *c. 2200*	*2600–2000:* bronze culture of Khawlan (Yemen). Links with Sudan and Ethiopia, and with the Levant	
2300: horse in Syria?		
2300–2200: destruction of Troy II; invasions by Amorite nomads in Palestine and Mesopotamia *c. 2200–:* the Guti invade Mesopotamia *2112–2004:* Third Dynasty of Ur	*2180–2030:* period of anarchy ("First Intermediary Period")	*2200–1700:* culture of Bactria–Margiana (BMAC)

Pacific can be observed for the Indian Ocean (or even for western Indonesia).[48] However, a banana – of an unknown type – was present in the Indus civilization, and the discovery of cloves at Terqa (Middle Euphrates), dated to 1700–1600 BCE, would provide evidence for indirect links between the Austronesian world and the west of the Indian Ocean as early as the second millennium BCE through unknown intermediaries. The possible introduction of bananas into east Africa during the late second/early first millennium BCE – as well as that of taro and water yam? (Blench 2009) – offers another indication of ancient interactions between the eastern and western Indian Ocean.

Table I.In.3 *Comparative chronologies (third–second millennium BCE): western Asia, and eastern Mediterranean; Egypt and Red Sea, western Arabia; India and Central Asia*

Western Asia and eastern Mediterranean	Egypt and Red Sea, western Arabia	India and Central Asia
2000–1700: first Palatial period in Crete *1900–1830:* Assyrian trade in Anatolia; Isin-Larsa period in southern Mesopotamia	*2040–1730:* Middle Kingdom *2000–1100*: culture of Subr-Sihi in southwestern Arabia	*1900–1700:* Late Harappan *c. 1900:* abandonment of Mohenjo-daro *1900:* Tazabagyab culture (Central Asia)
1800–: "Old Babylonian period." Hammurabi (1792–1750) (MC) *1751:* first Kassite invasion, Babylonian decline	*c. 1780–:* infiltrations of Hyksos from Canaan into the delta, "Second intermediary period" (*1730–1540*)	*1800:* end of Indus/ Mesopotamia contacts, urban decline, Indo-Aryan arrivals *1700:* end of BMAC, Ochre Colored Pottery culture
1700–1450: second Palatial period in Crete *1650:* founding of the Hittite Empire		*1800/1700–1500:* Beshkent-Vaksh culture; African plants introduced into India
1650–1200: rise of the Mycenaean culture *c. 1600:* founding of Mitanni *1595:* formation of the Kassite Empire (Babylonia)	*1540–1070:* Egyptian New Kingdom; expeditions to Punt under Hatshepsut; (*1472*) expansion under Thutmose III (*1479–1425*)	*c. 1700:* the Proto-Munda enter India *1500–1400:* arrival of "Rig-Vedic" Proto-Indo-Aryans Black and Red Ware culture (Ganges)
fourteenth–thirteenth century: rise of Assyria (disappearance of Mitanni, capture of Babylon); Elamite revival *1274:* battle of Qadesh between Hittites and Egyptians	Ramses II (*1279–1213*)	
c. 1200: invasions in Greece (end of the Mycenaean culture) and Anatolia (end of the Hittite Empire); invasions and destruction in the Levant and Cyprus; disappearance of Linear B in Crete	Invasions of the "Sea Peoples"; demise of the Subr culture (Yemen)	*1200–1100:* arrival of new Iranian groups in Central Asia, Iran, Pakistan, and India; introduction of iron metallurgy
1110: destruction of Susa by Nebuchadnezzar I (Babylonian state) *1100:* rise of Assyria under Tiglath-Pileser I; Neo-Hittite kingdoms in Syria and Anatolia	*1070–723:* "Third Intermediary period"	Painted Grey Ware culture (Doab-Ganges)

[48] P. Bellwood (2005: 139) notes that in western Indonesia we do not find the type of red slipped pottery characteristic of eastern Indonesia and the Philippines (Luzon), a pottery also known on the east coast of Taiwan. Western Indonesia had other types of pottery, which may also have originated in the Philippines, but data for this western area are sparse.

Table I.In.4 *Comparative chronologies (third–second millennium BCE): Inner Asia; China; Southeast Asia*

Inner Asia	China	Southeast Asia
3000–2500: Afanasevo culture	Dawenkou culture (Lower Yellow River) Longshan culture (Middle and Lower Yellow River) *3000–2500:* Qujialing culture (Middle Yangtze) *3300–2200:* Liangzhu culture (Lower Yangtze) *3000:* Majiayao culture (Gansu)	
2500–1900/1700: Okunev culture	*2600–2400:* Late Dawenkou culture	
2100–1900: Sintashta culture	*2500–1900:* Late Longshan culture. Towns of Taosi, Liangchengzhen, and Guchengzhai	*2500/2000–1500:* Phung Nguyen culture (Red River valley) Ban Chiang culture (Thailand)
2000–: complex of "Andronovo" cultures	*2100?:* bronze metallurgy	
1800–: Fedorovo culture and transcultural Seima-Turbino phenomenon (*1800–1500*)	*c. 2000:* Qijia culture *1950–1550:* Siba culture (Gansu) *1800–1600:* Erlitou state (Yellow River); control of bronze metallurgy	*c. 2000:* Neolithic on Malay peninsula
	1600–1050: Shang dynasty (capitals: Zhengzhou and Anyang); writing *1300:* appearance of chariots drawn by horses	*c. 1500:* bronze metallurgy in Thailand, and the Dong Dau culture (northern Vietnam) (*1500–1000*)
1400–850: Karasuk culture	*1027 BCE*: the Zhou take control of the Shang kingdom	

Table I.In.5 *Chronology of regions and sites of western Asia*

(a) Mesopotamia, Elam, N.E. Iran, southern Iran, Baluchistan, S.E. Iran

Dating	Mesopotamia	Elam	N.E. Iran	Southern Iran	Baluchistan	S.E. Iran
			Tepe Hissar	Tepe Yahya	Bampur	Shar-i Sokhta *sukkalmahs*
4000			(IB)			
	Middle Uruk					
3500		Susa II	IC			
3400	Late Uruk					
3300			IIA			
3200						I
3100		Proto-Elamite Susa III	IIB	IVC		
3000	Jemdet Nasr					
2900						
2800	Early Dyn. I					
2700	Early Dyn. II					II
2600	Early Dyn. IIIA	Susa IVA	IIIB		IV_1	
2500				IVB	IV_2	
	IIIB–C					
2400		Rulers from Awan			IV_3	III
	Akkadian Empire					
2300		Susa IVB			V	
2200						IV
2100	Ur III	Susa V Puzur-Inshushinak	IIIC	IVA?	VI	
2000			IIIC			
1900		Reign of *sukkalmah*s	IIIC?			
1800			IIIC?			
1700						
1500				End IVA?		

(b) Southeastern Iran, Afghanistan, Turkmenistan, Bactria, Pakistan

Dating	S.E. Iran	Afghanistan Mundigak	Turkmenistan	Bactria		Pakistan
	Shar-i Sokhta		Namazga (N)	Sapalli	Shortughai	Mehrgarh
4000			I			
3500		III	II			III
3400						
3300						
3200	I					
3100			III			
3000						VI
2900						
2800		III5–6				VII
2700	II	IV1	IV			VIIC
2600		IV1–2 (?)				
2500		IV3	V		1–2	
2400	III					
2300						
2200	IV	End IV abandoned?	transition			
2100			V/VI	Sapalli	3-4	
2000			VI?	Sapalli		VIII(?)
1900			VI			
1800						
1700				Bostan VI		
1500		V(?)			Yaz I	Pirak II

CHAPTER

1 The Birth of the State

The Neolithic Center of the Fertile Crescent

Western Asia was the first primary center of domestication of plants and animals, followed closely by China (Smith 1998; Harlan 1998; Bellwood 2005a).[1] The presence in the Fertile Crescent of vegetal and animal species that could be domesticated, along with the Crescent's situation as hub, were factors favoring the emergence of what has been called the "Neolithic Revolution." During the ninth millennium BCE, cereals (emmer wheat, einkorn wheat, barley), pulses (pea, lentil, bitter vetch, chickpea), and a fiber crop (flax) were grown and then domesticated (Tanno and Willcox 2006; Feldman and Kislev 2007; Colledge and Conolly 2007; Fu *et al.* 2012). Animals (goats, sheep, cattle, and pigs) were domesticated at the same time or slightly later. Agriculture and livestock farming encouraged a process of sedentarization of communities, rendering them able to harvest and to store food that could feed larger populations, and enabling them also to produce textiles and work leather. A change in social organization and a transformation in belief systems accompanied this revolution (Cauvin 1997). Cohabiting with domesticated animals brought in new diseases that would prove to be efficient weapons for the Neolithic centers in their relations with foreign countries (McNeill 1998b; Diamond 1997). From western Asia, cultivated plants and animals arrived in Turkmenistan and in the Indus valley (Mehrgarh) during the seventh millennium; these arrivals reveal terrestrial and perhaps maritime contacts. The diffusion of Asian species occurred as early as the eighth or seventh millennium in Egypt, Greece, and Crete. Even before the expansion of highly stratified societies, long-distance trade was noticeable; obsidian from Anatolia arrived in the Levant and in Mesopotamia, and shells were carried from the Persian Gulf to Mesopotamia, or from coastal Sind to Mehrgarh, during the fifth millennium. Lapis lazuli (originating in northern Afghanistan [Badakshan]), turquoise, and copper have been discovered at Mehrgarh and can be dated to the same period.[2] Lapis lazuli may have been traded as early as the sixth millennium.[3]

[1] The Highlands of New Guinea were another primary center for agricultural development in the ancient world. Unlike the Asian centers, New Guinea was too isolated – though Denham (2004) shows that this isolation was only relative – and it was technically limited in its ability to transform New Guinea into a pole of development and future core of a world-system. See Golson 1991; Bayliss-Smith 1996; Diamond 1997: 305ff. It is possible that vegeculture – based on plants reproduced by vegetative propagation – also developed in early times in Insular Southeast Asia, before the Austroasiatic and Austronesian arrivals (Barton and Denham 2011).

[2] Discoveries in the earliest layers at Mehrgarh of beads made of lapis lazuli, a stone originating in Afghanistan, of turquoise, brought from Iran or Central Asia, or of shells, all point to a certain amount of social differentiation and long-distance trade.

[3] Moorey 1994: 85–92. The identification of lapis lazuli at Tell Sotto (Yoffee and Clark 1993: 69) and at Yarim Tepe I (Iraq), around 6000 BCE, has been cast into doubt (Warburton 2003: 121), although these

When did the first maritime journeys in the Persian Gulf and along the coasts of South Asia occur? Probably very early on, if we consider the prehistory of the Mediterranean Sea (on Cyprus, the site of Aetokremnos, inhabited by hunter-gatherers, is dated to the tenth millennium BCE). There is no reason to suppose that the (pre-) Neolithic Arab and Asian societies did not develop the same skills in navigation.

ʿUbaid, a Proto-State Phase

Favored by progress in irrigation, visible at Eridu, Larsa, and Choga Mami (marks left by the use of the ard have been discovered, dated to 4500 BCE), demographic and economic growth, and increasing long-distance trade in Mesopotamia: all fueled a first expansionary process from the sixth millennium onward, in the ʿUbaid period (*c.* 5300–4100 BCE), at least during its phases 3 and 4. This expansion was also based on organizational innovations and a shared ideology, as shown in architecture, and in "seals with near-identical motifs at widely separated sites" (Stein 2009: 135). These changes led to competition between "households" as well as to hierarchies and growing social complexity (Lamberg-Karlovsky 1999: 181), which in turn encouraged the populations to invest in new techniques. A monumental architecture developed with the first proto-urban centers. As Stein expresses it, sites such as Eridu, Uqair (Iraq), and Zeidan (Syria) were "ancient towns on the threshold of urban civilization" (2009: 136). The Late ʿUbaid phases clearly "provide the prototype for the Mesopotamian city" (Oates 2014a: 1484). The successive "temples" at Eridu in particular – public buildings probably serving various functions – marked the emergence of a new type of social organization, overtaking kinship-based structures. Exhibiting niches and buttresses, erected on terraces (prefiguring the later ziggurat),[4] temples became larger during the ʿUbaid 4 period, toward the end of the fifth millennium. It is likely that a private sector already coexisted with a public sector, with interactions and structuring of power relations among the rulers of family households (extended families and their dependants), temples, and councils representing territorial communities. Within the concurrent process of political centralization, control over the temples may have already been a crucial issue (Lamberg-Karlovsky 1996: 82–84). The presence of fine ceramics and of stamp seals as well as evidence for a weaving industry in the "temples" of the urban center of Eridu[5] reveal an economic role that goes well beyond that of "food banks" redistributing agricultural resources.[6] "A Late ʿUbaid cemetery at Eridu, however, reveals little evidence of the social differentiation attested to in the architecture of either Eridu or sites like Zeidan and Uqair" (Oates 2014: 1481).

Agriculture and livestock farming progressed during this period. Culture of the date palm (*Phoenix dactylifera* L.) probably began during the sixth millennium (see below). The fifth millennium saw the development of the olive tree in the Levant, and of grapevine culture in

sites did also yield carnelian and turquoise, stones imported from eastern routes. The blue stone at Yarim Tepe is most likely azurite rather than lapis lazuli (Casanova 2013: 24).

[4] Unlike the high terrace of Susa I, however, the Eridu terrace was apparently not stepped (Potts 2014: 26).

[5] Also observed at Tepe Gawra XIII (Pollock 1999: 87).

[6] Matthews 2003: 104, versus Stein 1994: 44. For mass-produced decorated pottery, there is no evidence of any general control by the elite over production, but vessels were indeed produced for this elite (Matthews 2003: 108).

Georgia, southern Turkey, Iran, and the Levant (McGovern 2003). The rise of tree fruit production went along with exchanges. This would become more apparent during the period of urbanization. Moreover, sheep farming developed in Iran and neighboring regions for the production of wool, thus laying the foundation for a textile industry.

The ʿUbaid culture expanded in different directions during the ʿUbaid 3 phase. The Mesopotamians acquired prestige goods and the raw materials they needed by building maritime and terrestrial networks, probably by exporting textiles, leather, and agricultural products. In the Persian Gulf, the Ubaidians practiced fishing and exchanged goods with coastal Arab communities. They brought in domesticated animals and plants, and allowed for the spread of shipbuilding techniques. ʿUbaid pottery has been discovered at over sixty sites in eastern Saudi Arabia and Oman; it is mainly dated to the ʿUbaid 2/3, ʿUbaid 3 periods and to a lesser extent ʿUbaid 4 (Carter 2006).[7] Contacts stopped during the ʿUbaid 5 period. Arab communities played an active role in exchanges, along the coasts and in the Arabian interior (Boivin and Fuller 2009), where trade networks carried myrrh and incense from the Dhofar and the Hadramawt (Zarins 2002). Large quantities of ʿUbaid (3–4, *c.* 4500–4100) pottery have been found at Ain Qannas (al-Hufūf oasis), located inland, as well as some remains of cattle and goats (Potts 1990: 44). Also traded were obsidian (from Yemen or Ethiopia?), shells, shell beads, dried fish, and stone vessels, through the oasis of Yabrin and al-Hasa.[8] Shells of the *Cypraea* type have been discovered in fifth-millennium levels at Chaga Bazar in northern Syria, imported from the Gulf.[9] An interesting result of the excavation on Dalma Island is the discovery of charred date pits (probably from cultivated date palms); these dates may have been brought there via trade exchanges, or perhaps they were cultivated on the island (they are dated to the end of the sixth/beginning of the fifth millennium). Remains of fruit have also been unearthed at as-Ṣabīya (Kuwait) dated to the second half of the sixth millennium (dates would have great importance in food and trade from the third millennium onward).[10] Recent genetic research tends to support a Mesopotamian origin for date-palm domestication (Rhouma *et al.* 2008). The presence of carnelian beads (a stone originating in Iran or the Indus) is noteworthy at Qatari sites, along with Mesopotamian pottery. Carnelian beads have also been discovered in Mesopotamia dating from the ʿUbaid period (Inizan 1999).

At that time, Arabia was undergoing a subpluvial phase (7000–4000 BCE) marked by a strong summer monsoon; the Intertropical Convergence Zone was located 10° north of

[7] Some sites, on Dalma Island for example, may date as far back as ʿUbaid 1/2, end of the sixth – beginning of the fifth millennium (Beech *et al.* 2000: 42–43). However, for Carter (2006: 58), the assemblage of Dalma Island belongs to the ʿUbaid 4 period, and according to H. Crawford (p.c.) to the ʿUbaid 3 period. Gypsum vessels found on Dalma Island, however, are similar to those discovered on Marawah Island, dated to the sixth millennium (Beech *et al.* 2005: 48). A site on Marawah Island yielded ʿUbaid 1 or 2 pottery that may have originated in southwestern Iran (mid-sixth millennium) (Beech *et al.* 2005: 46). ʿUbaid 1–2 pottery has been found at Halili, on the Bushire peninsula (Oates 2014a: 1490).

[8] Zarins 1997: 257–258 and fig. 1, 2002: 428.

[9] A necklace with obsidian beads from Anatolia and cowries from the Persian Gulf has been found at Arpachiyah (British Museum WA 127814). We have evidence of exchanges with Umm Dabaghiyah, in northern Mesopotamia, that show a specialized trade in hides as early as the sixth millennium (onager, gazelle) (Silver 1995: 144). Rice (1994: 217) considers obsidian blades found at the site of Dosariyah as coming from Anatolia.

[10] Beech *et al.* 2000: 42; Tengberg 2004: 59.

its modern position. Weaker monsoons and a southward shift of the Intertropical Convergence Zone were accompanied by growing aridization; this put an end to the use of the inland routes at the start of the third millennium (Zarins 2002: 409ff.).[11]

The first Mesopotamian explorations in what was known as the "Lower Sea" favored the diffusion of shipbuilding techniques. Excavations at as-Ṣabīya (Kuwait, 'Ubaid 2/3 period) have unearthed bitumen which was used to caulk reed ships. The site yielded a terracotta model of these boats, which were of Mesopotamian design.[12] Probably carried on the inland routes of Arabia, obsidian which may have come from Yemen was discovered along with the remains of these boats. As-Ṣabīya yielded a painted disc featuring a boat with a sail supported by a bipod mast (Carter 2006: 54–55 figs. 3 and 4). Clay boat models from the cemetery of Eridu also show the use of a sail at the end of the 'Ubaid period;[13] these models appear to represent wooden ships, as does the model found in Syria at Tell Mashnaqa (Potts 1997: 125). The role of the 'Ubaidians should not obscure the existence of other networks, operated by Arab communities, along the coasts and in the interior of the Arabian peninsula (Cleuziou and Méry 2002: 303; Boivin and Fuller 2009: 126ff.). The location of the sites in the Gulf suggests that the 'Ubaid pottery found beyond Bahrain was probably carried by local communities, who used seagoing ships,[14] as revealed by tuna fishing – tuna was eaten and prepared for export by Omani communities during the fourth millennium. This pottery was considered a luxury item: sites in outlying areas produced imitations of the 'Ubaid pottery (Carter 2006: 59).

The 'Ubaid culture also extended eastward into Khuzistan, where Susa constituted a proto-urban center. It also extended north of Mesopotamia (especially during the Late 'Ubaid phase), toward routes already linking Central Asia, Afghanistan, and the upper valleys of the Tigris and the Euphrates: one finds Ubaid pottery as far as the Transcaucasus region, and lapis lazuli from Afghanistan is present at Tell Arpachiyah and Nineveh, in northeast Iraq; Tepe Gawra yielded lapis lazuli, as well as carnelian from Iran, but the blue stone could be more recent at this site.[15] Pottery from Susa, dated to the late fifth millennium, has been found further east in Iran, in a

[11] In fact, the phase of aridization began around 3200/3100 BCE; see below. The abandonment of trans-Arabian routes during the third millennium would be accompanied by the rise of maritime routes (first located on the Arabian coast, Dilmun was situated on Bahrain Island as of the middle of the third millennium).

[12] Carter 2002: 20, 21–23. Bitumen had been mixed with other substances, to make it easier to use. Moreover, the site yielded pits of dates. At 'Ain as-Sayḥ, a coastal site near Bahrain, ships were caulked with Mesopotamian bitumen, during a period lasting from the end of the sixth to the early fifth millennium, but this dating remains uncertain (Carter 2002: 16, 24).

[13] Qualls 1981, quoted by Cleuziou and Tosi 1994: 746. Qualls studied 403 representations of boats prior to 2000 BCE.

[14] Carter 2002: 14, 24 (see the coastal sites with 'Ubaid pottery on Dalma Island and on the west coast of Oman; in the central gulf region, the sites with 'Ubaid pottery "demonstrate a true settlement hierarchy," from the coast to the interior).

[15] Potts notes the appearance of lapis lazuli in Level XIII (4500–3900), but Casanova places it in Level XI (beginning of the Late Uruk, *c.* 3200 BCE) (2013: 29). Tepe Gawra also yielded alabaster, "steatite" and serpentine, which came via the Khorassan route; Gawra and other sites, such as Sialk, also contain turquoise, probably from Ma'dan (Nishāpūr) as early as 4000 BCE (and even earlier at Gawra). Gold and silver artifacts were present at Gawra during the fourth millennium; copper objects (from melted copper) appear in Level XII dated to the late fifth millennium.

region rich in copper. The quest for copper obviously played a crucial role in 'Ubaid and 'Ubaid-related expansion, as shown by the 'Ubaid "colony" of Değirmentepe, which was located near substantial copper, lead, and silver sources (Oates and Oates 2004).[16] Trade in copper and exotic goods favored a process of social differentiation, not only at Gawra, which Oates (2014: 1481) considers as "a northern Ubaid settlement," but also at Zeidan (12.5 ha), in northern Syria (Euphrates River valley), a site revealing monumental architecture.[17] Zeidan yielded evidence for copper metallurgy and administrative activity (a stamp seal has been found, dated to *c.* 4100 BCE) (Stein 2009: 134). At Susa, a settlement founded around the end of the 'Ubaid period rapidly grew to cover 10 ha. It included a high platform bearing a building (residence, warehouse). Seals and imprints have been discovered, with geometric and sometimes figurative designs (the motif of the "master of animals" is already present) (Pollock 1999: 90ff.).[18] During this period, Mesopotamia formed itself into a "central civilization" (Wilkinson 1995a). This expansion was accompanied by new social complexity in different regions, with the probable emergence of servile labor regulated by family chiefs.[19] One notes the use of stamp seals in Khuzistan, Luristan and Fars,[20] as well as in areas north of Mesopotamia.

The homogeneity of the material 'Ubaid culture implies active exchange networks, at the local level and between regions. Parallels established between the northern temple at Tepe Gawra XIII and buildings at Uruk (tripartite floor plan,[21] orientation, elaboration) reflect some cultural community and shared beliefs. Religion must have played an important role controlling communities and exchange networks. In 1936, 1952, and 1954, A. Hocart had already pointed out the possible religious origin of trade, and of social and state institutions. Moreover, ceramics made on the turnette (slow wheel) and the use of stamp seals can be observed throughout the 'Ubaid area: the diffusion of these technologies contributed to the homogenization of this space (Nissen 2001). A marked increase in the use of seals and mass-produced pottery (suggesting the distribution of rations) signal new social complexity. Seals and other devices reveal administrative activity. At Tell Abada, in east central Iraq, in 'Ubaid buildings, tokens have been found in pottery vessels, probably reflecting the keeping of records (Oates 2014: 1482).

[16] 'Ubaid material has also been recovered at Kara Höyük and Norşuntepe.

[17] The site is dated to about 6000 to 3800 BCE (Stein 2009).

[18] A cemetery of this period contained copper material (see below).

[19] McGuire Gibson, http://oi.uchicago.edu/OI/AR/01–02/01–02_Hamoukar. html. Frangipane 2000: 226–227.

[20] Pittman 2001a: 229. A much earlier use of stamp seals can be observed in villages of the Hassuna culture (Syria and northern Mesopotamia). For Lamberg-Karlovsky (1999: 177), this "revolution in communication" intervened "in the 'domestic mode of production,'" at the level of extended families. These stamp seals were later used in the Halaf culture, which came after the Hassuna culture. The Hassuna culture was the first to exhibit social differentiation; Halaf pottery was produced by specialists (Pittman 2001b: 411). Stamp seals were also used in the Samarra culture (as found at the site of Tell es-Sawaan, 5500–4800). The site of Arpachiyah yielded a sealed bulla. The Samarra culture shows distinct "households" (extended families), in tripartite houses with T-shaped floor plans, each containing ten to twelve rooms. These households must have included clients and dependants.

[21] "The standard Mesopotamian tripartite building first appears on the early Pre-Samarran levels of Central Mesopotamia (Tell es-Sawwan). It is also present in the south in the earliest level at 'Oueli" (Oates 2014: 1487).

The expansion of the 'Ubaid culture during the fifth millennium clearly shows the new dimension of the exchange networks, brought about principally by the rise of copper metallurgy. This technology appeared during the sixth millennium in Anatolia, and during the fifth millennium in Mesopotamia, Iran, Pakistan, and southeastern Europe.[22] It then spread to the north of the Black Sea (4400 BCE), and on to the Middle Danube valley (4000 BCE), to Sicily and the southern Iberian peninsula (3800 BCE).[23] This progression provides clear evidence for the expansion of exchange networks. Metalworking reached the Asian steppes from southern Russia during the fourth millennium. It would later spread to northwestern Europe around 2500 BCE. Copper and then bronze metallurgy required a supply of metal ore and an ability to transport it; thus new trade networks were set up on a larger scale, within social contexts that implied profound ideological and organizational changes. The 'Ubaid civilization acted as a catalyst for societies further north and east of Mesopotamia, with long-distance trade now involving a large area.

The end of the 'Ubaid phase *c.* 4100 BCE seems to have coincided with a period of global cooling and aridization in the eastern Mediterranean region and the Levant (Staubwasser and Weiss 2006). In Susiana, "even the Acropole of Susa was abandoned ca. 4000" (Wright 2013: 52). The 'Ubaid period prefigures the flowering of the Sumerian civilization during the Urukian period.

The Urban Revolution and the Development of the State in Mesopotamia

The First Half of the Fourth Millennium BCE

New progress in metallurgy was noteworthy during the fourth millennium. Anatolian sites operated mines (mainly in the region of Ergani) and practiced ore smelting (Çatal Hüyük, Tepeçik, Değirmentepe, Norşuntepe …). There are clues indicating copper metallurgy at Mehrgarh (Pakistan) before 4000 BCE. A wheel-shaped amulet from Mehrgarh has recently been identified as the oldest known artifact made by lost-wax casting (it is dated to between 4500 and 3600 BCE) (Thoury *et al.* 2016). It had been thought that tin bronze was produced at Mundigak (Afghanistan) during the second half of the fourth millennium, but recent reanalyses show no evidence of tin bronze (Pigott 2012a).[24] Feinan (Jordan) has been dated to between 3600 and 3100 BCE for copper ore mining (Hauptmann 2003: 91). This progress in metallurgy and the

[22] Copper metallurgy was present around 6000 BCE at Çatal Hüyük. The emergence of this large village, from 6700 to 5700 BCE, was first based on simple techniques of irrigation and trade exchanges (textiles and a long-distance trade in obsidian). Değirmentepe was another early center of copper metallurgy. Copper metallurgy has been dated to 5000 BCE at Tall-i Iblis (Iran) (Muhly 1995: 1503). As for the copper items of Susa I (dated between 4200 and 3800 BCE), we do not know if these were made from native copper, or from copper obtained after an ore-reducing process requiring a temperature of 1100°C (Benoit 2003: 53).

[23] The southern Iberian peninsula saw the development of a significant copper industry, which spread northward starting in 3500 BCE, reaching northwestern Europe around 2500.

[24] "The lack of evidence for tin-bronzes on the Iranian plateau before the late 3rd millennium BC and the [absence of] early (4th millennium) tin-bronze use at Mundigak mean that Afghanistan should no longer be cited as a possible source of the earliest tin in SW Asia" (Pigott 2012b).

transportation of various goods (not only raw materials but also manufactured products) probably explains why active trade routes were established during this period. These routes would remain of importance throughout the ensuing two millennia. The first bronze tools appear at Beycesultan around 4000 BCE, and at Aphrodisias around 4300 BCE (southwestern Turkey) (Joukowsky 1996: 143). Beycesultan also yields silver items very early on.

After the 'Ubaid period, eastern Anatolia took advantage of improved climate conditions and a fresh increase in exchanges. This region, along with northern Mesopotamia, saw the formation of proto-urban centers (Arslantepe, Hacınebi, Tepe Gawra, and most importantly, Khirbat al-Fakhar and Tell Brak)[25] (see Map I.1). Societies in Syria and Anatolia were already showing complex organizational characteristics during the first half of the fourth millennium, before "the documentation of regular contacts with the southern Uruk world" (Philip 2004: 209).[26] Public buildings were erected at Arslantepe during phase VII, before the period of contact with the Urukian world.[27] Godin (VI) was also expanding during the first half of the fourth millennium.[28] Hacınebi shows some social complexity during a phase dated 4100–3700 BCE, with stone architecture, administrative activity (stamp seals,[29] also found at Gawra, Tell Brak, Arslantepe, Değirmentepe), and metallurgy. Hacınebi was involved in exchanges between the Mediterranean, the Euphrates and Tigris valleys, and regions further east; it yielded artifacts made from chlorite, a stone imported from a region located 300 km to the east, shells termed "cowries" (Mediterranean shells?), some bitumen (from Mesopotamia), copper items (the metal probably came from the region of Ergani and/or from the Caucasus), and even silver earrings.[30] In northeastern Iraq, Khirbat al-Fakhar was a much larger proto-urban settlement – of low density – covering 300 ha, whereas the total area of the Late Chalcolithic 2 (LC2) (4100–3800 BCE) settlement at Brak reached at least 55 ha (Ur 2010: 395). At this time, Rothman has reported the existence of specialized "temple" institutions at Tepe Gawra (Rothman 2001b: 387–389), Tell Hammam et-Turkman, and Tell Brak (McMahon and Oates 2007: 148–155). "At Tell Brak, adjacent to a monumental building was a structure with abundant evidence for the manufacture of various craft items. The structure itself contained obsidian, spindle whorls, mother-of-pearl inlays, … " (Ur 2010: 394; see Oates *et al.* 2007). Mass-produced ceramics have been found, along with "a unique, obsidian and white marble 'chalice' " (Oates *et al.* 2007: 591, 594), showing the existence of social differentiation and organized labor.

[25] On Hacınebi, see Stein 1999: 125ff. On Arslantepe, see Frangipane 2001.

[26] See Stein 1999: 92, 103; Frangipane 2004a: 124.

[27] The presence of mass-produced bowls signals the existence of a centralized system based on corvée labor (Frangipane 2001: 329; 2004a: 124).

[28] Edens 2002b: 32. It is true that Godin VI exhibits an influence from southern Mesopotamia – or Susa – during the Middle Uruk (Badler 2004: 81) and that the exchanges with the Urukian world may have played a role in the expansion of the site.

[29] As mentioned, stamp seals were already present in villages of the Halaf culture during the sixth millennium. Stein (2004: 150) notes the existence at Hacınebi of two types of seals, possibly indicating the different status of their owners or different functions for the seals.

[30] Stein 1999: 125ff. Stein (2004: 150) also notes the discovery of ceramics comparable to the Amuq F assemblage (Orontes valley region).

These (proto-)urban centers constituted nodes along east–west networks that extended further into Iran and Afghanistan, in one direction, and to the Syrian coast in the other. Lapis lazuli has been found at Iranian sites such as Tepe Sialk, Tepe Giyan (first half of the fourth millennium BCE), Tepe Yahya (3750–3650 BCE), and in northern Mesopotamia, at Tepe Gawra (3200 BCE?), Nineveh, Arpachiyah (4500–3900 BCE) (Casanova 2013: 27ff.). "There was extensive evidence for exploitation of lapis lazuli at Tepe Hissar during the 4th millennium BCE" (Petrie 2013a: 7). The presence of lapis lazuli reveals the existence of routes linking Central Asia, Iran, and northern Mesopotamia; it is rare, however, during the 'Ubaid period and the first half of the fourth millennium. Moreover, trade networks formed with northern regions: obsidian came from central or eastern Anatolia, and "ceramics [from northern Mesopotamia] have been found in eastern Anatolia (Marro 2007) and in Azerbaijan (Akhundov 2007)" (Ur 2010: 395). Interactions between the spheres of Anatolia–Levant and Mesopotamia took place during the flourishing of the 'Ubaid culture; they continued after its demise. On the basis of glyptic art, H. Pittman notes "a shared symbolic ideology" during the Late 'Ubaid–Early Uruk in Syria, northern Mesopotamia, and Khuzistan (2001b: 418).

During the LC2 period, the first proto-urban centers seem to have lacked internal political centralization. But from the LC3 period (3800–3600 BCE), Tell Brak grew into a large urban center, becoming a dense settlement of 130 ha, "prior to the Uruk expansion" (Oates *et al.* 2007, Ur 2010: 396).[31] Another major site was located at al-Hawa, 40 km east of Hamoukar; it may have been as large as 33–50 ha. Hamoukar (near Khirbat al-Fakhar) and Leilan were smaller settlements. According to Algaze, however, Hawa and Samsat – a city now submerged as a result of the construction of the Ataturk dam – truly developed "after the onset of contacts with the Uruk world" (2008: 120).

Domestic structures in Tell Brak "show evidence of high-value items and exotic materials," and of property-control mechanisms. "A cache from a pit included two stamp seals and 350 beads, mostly of carnelian but also silver, gold, lapis lazuli, and rock crystal (Emberling and McDonald, 2003, p. 9)" (Ur 2010: 396). Seals and sealings have also been discovered at Hamoukar (Reichel 2002).

Quoting Algaze (2008: 118ff.), Ur notes that "Brak's urban significance has been downplayed because, unlike the cities of southern Mesopotamia, it was a primate center without intermediate centers in a proper urban hierarchy" (Ur 2010: 399).

The process of urbanization was accompanied by violence: traces of massacres have been discovered in Tell Brak, and structures were destroyed by fire at Hamoukar and Brak. Whether due to internal disorder[32] or attacks by southerners, the origin of this violence is still debated.[33] Also debated is the dating of the Eye Temple at Tell Brak. For Oates *et al.* (2007: 596), it was built prior to the Uruk expansion, in the LC3 period

[31] Ur (2010) writes "a few centuries or more" before the Uruk expansion, but this seems to be an exaggeration. Morris (2013: 153) gives an estimate of 8,000 inhabitants in Tell Brak in 3500 BCE, which is probably too low.

[32] Global climate cooling around 3600 BCE may have aggravated the city's internal problems.

[33] Hamoukar was the site of a battle around the middle of the fourth millennium; in 2005, the Oriental Institute of Chicago discovered more than "1200 smaller, oval-shaped bullets and some 120 larger round clay balls" that must have been used in the defense of the city. "It is likely that the southerners played a role in the destruction of this city" (C. Reichel, www-news.uchicago.edu/releases/05/051216.hamoukar.shtml).

(3800–3600 BCE), but other archaeologists date the construction of the temple to 3500–3300 BCE. The temple was decorated with clay cones, copper panels, and goldwork, in a style similar to contemporary temples of southern Mesopotamia. "Eye idols have also been found at Tell Hamoukar (Reichel 2002)" (Oates *et al*. 2007: 596).

The Urukian Expansion during the Second Half of the Fourth Millennium BCE

Interactions with southern Mesopotamia can be seen from 3600 BCE onward, when the latter region experienced major urban development accompanying the birth of the state. As Algaze makes clear, "polities in the north hardly equaled their southern counterparts" (2008: 120). This southern urban development was based on agricultural progress generating demographic growth. Increased irrigation, the use of the ard drawn by oxen and the creation of date-palm plantations led to the creation of large estates; only estates of significant size were able to invest on a scale ensuring surpluses that supported urbanization.[34] Sherratt (2006a) has shown convincingly that the ard was developed along with the urbanization process; it may have been first employed to make furrows for irrigation; it required a major investment, which in turn explains its symbolic link with political power. The use of sledges on rollers to remove seed husks heralded the invention of the wheel.

Urbanization was also based on the progress of various crafts, such as ceramics (the invention of the potter's wheel made mass production possible, and this was linked to new social practices [the use of fermented beverages][35] and organization [distribution of rations]), metal artifacts, and textiles made of flax or wool (see below). Growth in sheep populations is seen at several Urukian sites at the end of the fourth millennium (such as Tell Rubeidheh); this may have been spurred by the state leadership (Kohl 2007: 222).[36] Sheep production certainly represented one driver of the Uruk expansion.[37] Selected in Iran, wool-bearing sheep breeds spread rapidly westward: some of the first-known wool remains, dated to the late fourth millennium, come from El Omari, in Egypt (Good 1998: 658).

The production of new goods was connected to the building of hierarchized urban societies; not only did exported manufactured goods lay the groundwork for an asymmetric exchange with peripheral regions; they also fostered local developments (the social

[34] Texts from the late fourth millennium describe extensive palm groves (Tengberg 2004). In 2003, a German expedition partially mapped the city of Uruk, and discovered a complex system of channels.

[35] Sherratt 2004. The potter's (fast) wheel, which speeded up pottery production, may have been a response to two constraints: lack of manpower and increasing demand (Nissen 2004: 9). The wheel was also used in Syria and in southeastern Anatolia. In addition, Pollock (1999: 96) notes the use of the bow drill at this time, for engraving seals.

[36] We will observe this process more clearly during the third millennium, particularly during the Ur III period.

[37] McCorriston 1997: 521, 534. Pollock (1999: 107) also points out "an emphasis on sheep and goat in the southern lowlands [during the fourth millennium] … a sign of the growing importance of secondary products, such as milk, dung, wool, hair, traction and transport." This evolution had little impact on Egypt, where flax remained predominant.

role of fermented beverages in Mesopotamia, for example, may have led to expansion in grapevine culture on the Mediterranean shores, as Sherratt has suggested).

The Urban Revolution benefited from increased long-distance trade, and helped further its development; commerce first involved textiles, slaves, and copper, which was used to produce weapons and tools. The development of copper and later, bronze metallurgy underlay the emergence of political power: "only elites could organize the long-distance procurements of costly copper and tin, as both were scarce," and both proved necessary to social reproduction (Ratnagar 2001a: 355). Bronze was initially an alloy of copper and arsenic,[38] then of copper and tin (the latter alloy being harder than the arsenical bronze).[39] Bronze metallurgy spread from the fourth millennium onward, through the trade routes, with a possible diffusion to China between 3000 and 2000 BCE (Pernicka *et al.* 2003). The production of bronze artifacts increased not only agricultural productivity,[40] but also military power: competition between cities was not always peaceful, and the extension of conflicts certainly played an important role in the building of the state.

The rise in exchanges was partly linked to the birth of a new ideology of political control as well as to institutional innovations. The state played a crucial role, organizing production and exchanges, as well as redistributing wealth.

In conjunction with the rise in exchanges and processes of internal development, southern Mesopotamia experienced a radical new flourishing. Already inhabited *c.* 4600 BCE, the site of Uruk (Warka) grew from 3600 BCE (Middle Uruk) and covered 250 ha *c.* 3100 BCE – which may have represented a population of 20,000 to 40,000 – and 600 ha *c.* 2900 BCE at the end of the Jemdet Nasr period (according to Morris [2013: 153], Uruk had 45,000–50,000 inhabitants by the late fourth millennium). During the Early Uruk period, the city of Warka grew "at the expense of the Nippur-Adab and Eridu-Ur areas" and of Upper Mesopotamia (Algaze 2008: 108, 110; Kouchoukos and Wilkinson 2007): the population of the northern Jazirah decreased, especially from 3500 to 3300 BCE; the same held true for the Fars Plain; northern cities (Tell Brak, Hamoukar) grew smaller, leading Algaze to speak here of an "aborted urbanism" (2008: 117, 121). Other southern cities probably expanded during the late fourth millennium, absorbing rural populations: Nippur, Adab, Kish, Girsu, Ur, Umma, Tell al-Hayyad. None of these cities, however, are comparable to Uruk.[41] Algaze rightly emphasizes that "large settlement agglomerations were almost certainly unable to demographically reproduce themselves without a constant stream of new population" (2008: 29).

[38] For Potts (1997: 165), arsenical copper originates from the ores of Anarak, in Iran. Arsenic may have been employed first for the silvery effects it gave to the metal (Sherratt and Sherratt 2001: 34 n. 23).

[39] Early dating (fifth and fourth millennia) had been proposed for bronze objects in a copper-tin alloy found in the caves of Ghar-i Mar and Ghar-i Asp in Afghanistan (Dupree 1972), but this dating has since been put into doubt.

[40] For Ratnagar (2001b: 355 n. 8), "we have no evidence, from any of the great river valleys, that bronze tools were extensively used in agriculture." Metal recycling and the fact that these tools were not deposited in the tombs make them invisible in archaeology. It is likely, however, that the elites largely controlled bronzeworking and the use of this alloy.

[41] We do not know the actual size of these cities during the different Uruk periods. Further investigation is needed.

(McNeill [2000: 204] "pointed out intensified mortality as a result of crowding, with the appearance of a variety of diseases.")

Various authors have stressed the importance of the ideological and organizational changes occurring during the birth of the state.[42] The Mesopotamian agglomerations probably meet the criteria proposed by Wengrow for defining a city: "the existence of a class or classes of individuals not directly involved in agrarian production, a high density of permanent residents, access to ports and trade routes, centralized bureaucracy,[43] a concentration of knowledge and specialised crafts, political and/or economic control over a rural hinterland, the existence of institutions that embody civic identity," and the monumentality of some of its buildings (Wengrow 2006: 76–77). These towns or cities constituted – at one and the same time – political, economic, and religious centers. It is possible that chiefs were primarily religious chiefs. Political power may have emerged as the result of the internal dynamics of the royal system: "It was only when the [various] ritual functions of the [chief] were separated from one another that political power and state organization emerged and developed" (Scubla 2003; Hocart 1970). L. de Heusch also writes: "It is the symbolic construction elaborated on the figure of a magician-chief that allows the genesis of the state, wherever a hierarchy of status or social classes develops" (1997: 230).

Not only was there intensification of labor through biological, technological, and organizational innovations; there was also a more efficient mobilization of the labor force itself. Southern Mesopotamian cities proved better able "to amass and control information, labor and surpluses vis-à-vis those of their immediate neighbors" (Algaze 2001: 70). This efficiency was seen in both economic and political-religious organization. Community lands held by extended families came under the management of "institutional households." The temples, which owned land, craft workshops and herds, were organized as "profit centers" (Hudson 1996: 37). The growing importance of the temple complex[44] paralleled the emergence of a ruling class that was organized as an assembly of community leaders, who managed most of the production and long-distance trade.[45] According to Pollock, the Uruk rulers probably extracted tribute to feed the city. Uruk was the religious capital of Sumer

[42] Tosi and Lamberg-Karlovsky 2003: 348. This revolution has its roots during the period 4150–3800 BCE, a time of "experimentation with new modes of political organization … and new strategies and technologies of control," as H. T. Wright suggests (2001: 145). For the third millennium BCE, M. Liverani (2014: 108) points out "the divine foundations of kingship."

[43] See Ur 2014 (below), however, for another vision.

[44] Nissen (2004: 14), however, notes that the exact place of the temple itself in the Uruk economy remains unknown. Little can be gleaned from the texts available. The precise relationship between the temples and the political sphere is no clearer. For Lamberg-Karlovsky (2003: 62, 70), there was a "coevolution" of the temple, writing, urbanization, statebuilding, and the development of crafts, with textiles playing a crucial role. During the Jemdet Nasr period (3100–2900 BCE), the temple of Khafajeh yielded seals, jewels, and kilns (Pollock 1999: 100). For Pollock, there is little evidence to suggest a direct involvement of the temple in production during the preceding period of the Late Uruk (1999: 115).

[45] Means of production such as oxen, seed drills, plows, probably belonged to the various state institutions (Ekholm Friedman 2000: 166). One may not follow J. D. Forest, however, when he argues that "free entreprise has not been invented yet and economic logic cannot be observed. The goods transported did not generate any profit." "The whole system," adds Forest, "was put in place and managed by the elites of

(Algaze 2008: 114), and may also have been the political capital of a Sumerian state (Yoffee 1995b; Westenholz 2002; Matthews 2003).[46] Various elements, however, do suggest the existence of a league of Sumerian cities around 3100 BCE (rather than a single state), a league perhaps headed – as later in the third millennium – by a LUGAL ("great man"), "ceremonial head of the assembly [UNKEN] of city rulers."[47] For Glassner, there was no king yet at the head of the state: an assembly of community leaders was "managing the affairs of the city."[48] Twenty cities are thus mentioned on a seal, from Urum (Tell Uqair) in the north to Ur in the south. Remains of temples and "palaces" have been discovered; they show decorations of niches and pilasters as well as characteristic facade ornamentation using colored "nails" forming geometrical patterns.[49] Algaze (2008: 190), however, believes that kingship was already instituted. The "Titles and professions list" during the Jemdet Nast period starts with a man called NAM_2+ESDA, a term translated as "king" during the second half of the 3rd millennium. Moreover, Algaze emphasizes an "iconographic continuity between the 4th and the 3rd millennia for the 'priest-king/city ruler'" (2008: 190, 153). The true nature of the Urukian institutions, in fact, remains unknown.

Some ceramic objects – beveled-rim bowls – were mass-produced and standardized, probably reflecting the distribution of "rations,"[50] in "a system of mass labor" clearly made visible through the size of public buildings;[51] these rations may also have been linked to workshops producing goods for the state such as textiles. "Many of the Archaic texts record disbursement of textiles and grain to individuals. [They may represent] rations given to some sort of fully or partly dependent workers" (Algaze

the South Mesopotamian city-states who were the only authority able to harness energies" (2003: 128–129).

[46] It is not impossible that the great priest EN of Uruk was also a political ruler (Westenholz 2002: 34). Gilgamesh is called "either EN, or LUGAL, according to his activities" (Joannès 2005: 53).

[47] Westenholz, 2002: 34. We cannot exclude the possibility that this league was (re)constituted after the disintegration of a "state" led by Uruk. In line with established practice, Sumerian ideogrammatic terms are written in capital letters.

[48] Glassner 2000a: 267ff., 2000b: 46. LUGAL would mean "king" from the Sargonic period on, according to Westenholz (2002), but the concept of kingship had appeared earlier (see below).

[49] We are only really aware of Level IVA (Late Uruk); there is little to no information about earlier levels. It is difficult to use the finds at Uruk as a basis for establishing a chronology of the potteries, or to date the appearance of bullae, cylinder seals, or written tablets (Nissen 2004: 7ff.). The enclosures of the Eanna, the "House of Heaven," dedicated to the goddess Inanna, and of Kullab, dedicated to Anu, included "temples" and "palaces" (Algaze 2001: 33; Nissen 2001: 154; Joannès 2001: 254–255; Huot 2004: 79ff.). The buildings of the Eanna comprised shrines, storerooms, workshops, and administrative centers (McIntosh 2005: 65). The structure of the Mesopotamian temples derives from the "temples" of the 'Ubaid period. Susa shows the construction of a stepped high terrace, the southern facade of which was decorated with clay nails, as in the Uruk culture ("the high terrace on the Acropole mound at Susa [is] dated to c. 4000 BC … This monumental structure covered 6,400 sq. m" [Potts 2014: 23, 24]).

[50] Pollock 1999: 94–96. Other hypotheses have been proposed: preparation of bread, and votive offerings (Nissen 2004: 9–10). For Pollock, increased demands for tribute and *corvées* imposed on village communities would explain a migration of the inhabitants to the towns and an extension of other processes of centralization. "The combination of increased tribute demands and growth of an urban-based workforce may have promoted the adoption of time and labor-saving technologies and segmented manufacturing processes" (1999: 96).

[51] See the platforms, terraces, and temples at Eridu (Early Uruk period), Uruk (Middle and Late Uruk), and Brak (Middle Uruk); Wright 2001: 141, 143, Nissen 1988: 83–85.

2008: 130). In S. Pollock's view, during the third millennium, the economy moved from a tributary system (tributes were extracted from the rural sector) to a system of "households" employing their own labor forces, servile or not; these "houses" were not only temples and palaces, but also estates belonging to high-level officials or the rulers of extended families.[52] As early as the Urukian period, the archives of the institutional estates evoke the management of land, of herds, and of the labor force (Glassner 2000a: 238ff.), probably with economic viability in mind: here we are outside the context of a simple tributary system.

The emergence of the state and the rise of exchanges brought about the use of new techniques that spread widely, allowing for growing control over the movement of goods, information, and individuals. Calculi and seals on clay bullae containing these calculi represent systems noting quantities that reveal accounting management. They can be found in a vast zone going from Iran to Mesopotamia and Syria: all of western Asia was involved.[53] At Uruk, then at Susa, around 3500 BCE (or slightly later?),[54] cylinder seals appeared (only stamp seals had been used in earlier times) to seal merchandise (bales or jars) and doors.[55] Numerical tablets, each one sealed by the imprint of a cylinder seal, have been unearthed in levels belonging to this period.[56] With the development of cylinder seals, a new iconography flourished that legitimated the power of the elite: it often figures a hero – perhaps already a "priest-king" or deity? (see above) – who is a master of wild beasts, a war leader, a feeder of domestic animals and "a fountain of agricultural wealth" (the hero holds a vase with flowing streams, a symbol of abundance and a possible reference to the role of the state in irrigation systems); he is alternately portrayed as an officiator in religious ceremonies (according to Glassner [2000a], however, versus Algaze [2008], the seals and cultic objects feature different characters, not just one). We can observe this iconography from early periods in Iran and Egypt. For Pittman, in fact, "the characteristic Uruk imagery was first developed and found its richest expression in Susiana" (2013: 295). At Susa and Choga Mish, east of Susa, cylinder seal impressions show temples on high platforms (Oates 2014a: 1491; Amiet 1980: 695).

[52] Pollock 1999: 118–120. This author considers that a "tributary structure" had already been put into place during the 'Ubaid period. The tributary system would have led to migrations of populations, some of them into towns (see above). An increased disequilibrium between rural communities and cities favored technological innovations and finally led to a change in economic organization, with a transition to a system of *oikoi* employing their own labor force (Pollock 1999: 96).

[53] Margueron and Pfirsch 2001: 103. In Syria, hundreds of clay sealings (made with stamp seals) and calculi have been unearthed at Tell Sabi Abyad, within a Late Halaf context (sixth millennium). Calculi in fact appeared at various sites as early as the seventh millennium (see above). Bullae have been found at Susa and at Chogha Mish (Potts 1999: 65). The shape of the calculi indicates their numeric value, according to a system essentially sexagesimal, and secondarily decimal.

[54] Datings proposed at Uruk are problematic, because of the excavations at this site, and more generally speaking – for the whole region – because of problems with radiocarbon dating. Petrie thus points out that "the most problematic factor impacting upon the absolute dating of the late 4th millennium BC is the extended plateau in the radiocarbon calibration curve from c. 3350 to 2900" (2013b: 388).

[55] Technically, Pittman (2001b: 419ff.) links the development of cylinder seals with the invention of the drill, which was also used for the production of stone vessels. The drill would also be used for the decoration of stamp seals. Quoting Pittman (2013), Petrie notes that there is "no overt evidence for the development of cylinder seal technology at Uruk during the Middle Uruk Phase" (2013b: 406 n. 4).

[56] The Urukians used thirteen different types of accounting; the "signs tell what units of measure are employed, [and] they indicate the nature of what is quantified" (Glassner 2000a: 178, 180).

The Susiana Plain was "part of the Uruk world between 3800 and 3150 BC" (Wright 2013: 63); it is likely, however, that during the Early and Middle Uruk periods, "an independent state based at Susa developed in Susiana" (Petrie 2013b: 388). For her part, Pittman (2013) "queries the primacy of southern Mesopotamia in the development of the administrative innovations that took place in the 4th millennium" (Petrie 2013b: 391). For Pittman (2013: 321), Susa was the source of many of the "Mesopotamian" innovations. One notes the appearance "of bevel-rim bowls and other Uruk forms at Ghabristan, Sialk, Tal-e Kureh and possibly Tal-e Iblis" (Petrie 2013b: 13): the question remains to know whether we observe a process of colonization, trade, or emulation/coevolution[57] (at Susa for example, and from Susa) (Rothman 2001b: 21).

Copper metallurgy developed in Iran during the fourth millennium BCE, using crucible-based smelting technology, for example at Tal-e Iblis (periods III and IV), Tepe Sialk (III and IV), Tepe Hissar (II), Tepe Ghabristan (II), Arisman, Godin Tepe (VI.1), and Susa (Weeks 2013). We do not have evidence of ancient mining at Anarak, but local mineral sources must have been used. Iran exported copper and copper artifacts.

The juridical power of the state was constituted at this time. We know from Nissen that "group size and amount and level of conflicts are systematically and inseparably interconnected"; the dimension of Uruk implies the setting up of a system of laws and sanctions, as well as an organization that is able to implement them (Nissen 2004: 14).

Among the crucial innovations of the Urban Revolution figure techniques of power and new forms of organization. Bullae, calculi, and cylinder seals have already been mentioned. The first signs of writing appeared around 3300 BCE at Uruk (the exact period is not known), in response to the growing complexity of commercial transactions and social organization, and to the building of a system of relations between the Sumerian city-states, interacting with a periphery of pastoralist or sedentary populations.[58] The development of writing laid the groundwork for the state's ideology, with the creation of a body of scribes whose apprenticeship must have also been an "indoctrination" (Pollock 1999: 169). Writing quickly acquired a sacred dimension: along with iconography, it brought about contact with the world of the gods. In the economic field, most of the ancient documents contain lists of goods that were received, sent, or stored, such as grains, milk products, wool, textiles, metals … Some of these documents show attempts at economic planning. They have usually

[57] On this concept, see also Chase-Dunn 1988, and Sherratt 1993.

[58] Mainly resorting to metaphor and metonymy, the system is logographic and uses phonetic values and syllabism; "the visual marks of invisible analogies," most of the signs are polysemic and polyphonic (Glassner 2000a: 13–19, 202, 220–224). Stamps, seals, and written symbols reflect a general shift in social relations. They guarantee property rights, transfer of goods or of powers, and they have – in writing especially – an identifying function (Glassner 2002b: 368). Going further, Glassner (2000a: 15) makes the point that the invention of writing cannot be considered simply as a response to increased economic and administrative complexity, as its very existence transformed our relation to knowledge and cultural memory. Obviously, writing was linked to the political and religious spheres (divination, the calendar …). Considering a "gradual trajectory" from the earliest notational systems (marks on pottery, on bullae …) to writing (Lamberg-Karlovsky 2003) is a theory that fails to take into account the cognitive revolution writing implies.

been found in the vicinity of public buildings.[59] A vast majority of tablets thus reflect the existence of a centralized and hierarchized administration. Archaic texts from Uruk refer to social differentiation and the organization of various professions.[60] They reveal the existence of slaves of local or foreign origin. "A larger pool of dependent labor available gave a comparative advantage" to southern Mesopotamia (Algaze 2008: 81). Slaves probably worked on irrigation systems and constructions. As Algaze rightly points out (2008: 146–147), "innovations in communication [writing, accounting systems], [transportation] and labor control were fundamental for the Sumerian takeoff." The city of Uruk was crisscrossed by canals used for transport and irrigation.

Slaves also worked in workshops. "The second most frequently mentioned commodity in Archaic texts [after barley] is female slaves" (Algaze 2008: 129). A tablet from Uruk refers to 211 women slaves, who produced textiles for the temple.[61] Many Uruk texts deal with wool and textiles (woven woolen cloth),[62] which probably represented the first exports of the Mesopotamian cities, in addition to leather, agricultural products, perfumed oils, and metal artifacts. During the third millennium, "iconography from cylinder seals and sealings depict various stages of textile production" (Algaze 2008: 81). Archaic texts "attest to the existence of temple/state-controlled sheep herds" (Algaze 2008: 87).[63] It is likely, also, that raw wool imports contributed to the growth of the textile industry in the southern Mesopotamian cities. Wool, notes Algaze (2008: 79), was more easily dyed than linen, and "economies of scale were achievable by using wool as opposed to flax." "The mass production of textiles" financed by elites was clearly "an urban phenomenon" (Algaze 2008: 84). "The earliest economic records and lexical lists also include numerous references to metals" (2008: 93) (see below). In sum, the flourishing of different crafts linked to institutions can be observed. Southern Mesopotamia had at least two other crucial advantages over the north: a higher density of population and efficient water transport, facilitating trade.[64] The Mesopotamian elites ensured the supply of necessary raw materials: metals, stone, and wood. There is

[59] The connection, however, is far from certain; see Nissen (2004: 12) for the site of Uruk. Some documents from private archives have come to light, showing "a minimal use of writing" (Glassner 2000a: 234ff.).

[60] See the lists of titles and professions found during the Late Uruk period and repeated for nearly one thousand years (Nissen 2004: 13). At the end of the fourth millennium, the scribes themselves seem to have been associated with six different professions (Glassner 2000a: 143). "Among the Warka IVA tablets," notes Oates, "there is a surprising number of lexical texts presumably used in teaching, suggesting a longer previous history of writing" (2014a: 1486). It is clear that the public sector was largely at the origin of the growing social complexity in the Late Uruk period, in response to various constraints. The different lists that have been found indicate a willingness "to put the world in order" (Glassner [2000a: 253] speaks of a Sumerian obsession with classification).

[61] Textile workshops employing women in a situation of dependence are well known for the third millennium. It is possible, also, that some communities had a semi-servile status (Wright 2001: 140).

[62] The symbolic importance of weaving has been emphasized by Glassner (2000a: 214).

[63] On the centrality of textiles to the early Mesopotamian urban process, see McCormick Adams 1981: 11 (cited in Algaze 2008: 92). "Of the emergent industries of the time, none would have contributed more to the growth of internal diversification, specialization and overall employment than woolen textile manufacture."

[64] "Waterborne transport in ancient Mesopotamia could have been about 170 times more efficient than the average donkey caravan" (kg/km/day) (Algaze 2008: 61).

little doubt that the state was involved in long-distance trade.[65] During the second half of the fourth millennium, exchanges benefited from innovations in transportation: waterway development, clearly visible at Uruk; improvements in shipbuilding; domestication of the donkey (both in Egypt and in western Asia) and the use of the wheel. A written sign reflects the presence of donkeys during the Uruk period. Recent genetic research shows that donkey domestication first took place in Egypt, from a Nubian subspecies, *Equus asinus africanus* (the first remains of domesticated donkeys were discovered in a Predynastic tomb, at Ma'adi, dated *c.* 4500 BCE). A second domestication occurred from another subspecies related to *Equus asinus somaliense*, but another breed – today extinct – may have lived between Yemen and the Levant; it may have been the ancestor of this second domesticated set (Beja-Pereira *et al.* 2004; Vila *et al.* 2006). Wild donkeys may have been domesticated in Mesopotamia (Uerpmann 2008: 441), where remains are dated to the Middle Uruk period at Tell Rubeidheh, in the Diyala valley. As already mentioned, the wheel was probably developed in northern Mesopotamia, Syria, or eastern Anatolia at the time of the Urukian expansion (Sherratt 2006a).[66] From Anatolia, use of the wheel and the wagon spread along the Danube and the Black Sea. Their arrival went along with the dislocation of the large villages of the Cucuteni-Tripol'ye culture (located between the Dnieper and the Danube) around 3600/3500 BCE, during an ecological crisis brought about by a climatic aridification and a degradation of the environment linked to anthropogenic activities.[67] We cannot exclude a diffusion of wheel and cart through the Caucasus. The remains of a wagon found in a kurgan at Starokorsunskaja (Maykop culture) have been dated to *c.* 3500 BCE (Trifonov 2004; Primas 2007). Clay models of wheels have also been excavated from the earliest levels at the site of Velikent (same period) (northeastern

[65] See the discovery of numerous exotic goods in the foundations of a building of the Eanna (Algaze 2001: 35). Moreover, H. T. Wright (2001: 137) contemplates the existence of mobile craftsmen organized "in guildlike corporate groupings"; this may explain the homogenization of Urukian material styles (ceramics, bricks …).

[66] Models of wheels (made of terracotta or stone) are known at Jebel Aruda and in the Kura-Araxes culture. They show the use of a rigid axle, with wheels turning independently. In addition, a wall painting at Arslantepe (dated to *c.* 3370 BCE) shows a pair of draught animals. The wheel is recognizable on pictograms of the Late Uruk period.

[67] One may wonder whether or not epidemics – favored by settlement size and promiscuity between people and animals – contributed to the dislocation of the great villages of the Cucuteni-Tripol'ye culture; settlements seem to have been abandoned after fires, which were quasi-universal rituals of purification during epidemics. The farmer-herders of the Cucuteni-Tripol'ye culture became mobile pastoralists, with wagons, who moved into the steppes (cf. the Sredni Stog culture, the pre-Maykop culture north of the Caucasus, then the Yamnaya culture [Pit Grave Culture, 3200–2400] …), at the same time continuing to practice agriculture (Kohl 2002: 161, Rassamakin 2002, and Scarre 1999: 148). The wheel seems to have been introduced in the north of the Caucasus soon after the collapse of the Cucuteni-Tripol'ye settlements (Sherratt 2006a: 351). While a west–east movement of population accompanied the dislocation of the Cucuteni-Tripol'ye culture, conversely east–west movements may have occurred at an earlier period, if the identification of buckwheat (*Fagopyrum sagittatum* Gilib., family of the Polygonaceae) among the plants present in the Cucuteni-Tripol'ye culture is confirmed (this identification has recently been challenged). This plant originated in the western Himalayas (Janik 2002: 300ff.). Broomcorn millet *Panicum miliaceum* has been found in Cucuteni-Tripol'ye sites, and in the Late Sredni Stog culture; it was domesticated during an early period in China, but perhaps also in the Pontic steppes. The question of an eastern arrival, however, remains open.