The Sea in History
The Ancient World

La Mer dans l'Histoire
L'Antiquité

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Les infrastructures portuaires antiques

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Résumé. *Cette contribution se concentre sur les principaux ports maritimes de l'époque classique (c. 800 av. J.-C. à 400 ap. J.-C.), y compris les ports fluviaux avec accès direct à la mer et en particulier ceux dont les vestiges ont survécu de manière significative. En traitant à la fois des ports militaires et de commerce, elle étudie la relation entre les développements technologiques et l'augmentation de l'activité commerciale et politique. La question du rôle commercial des ports et cités portuaires pour les États et leurs dirigeants est également abordée, ainsi que les raisons pour lesquelles les états investissaient fréquemment d'importantes ressources dans les projets d'infrastructure maritime.*

Abstract. *This contribution concentrates on the major maritime ports of the Classical world (c. 800 BC to c. AD 400), including river ports with direct access to the sea, focussing on those of which significant physical remains survive. It deals with both naval harbours and trading ports and assesses the relationship between technological developments and increased commercial and political activity. It also discusses the political and commercial importance of ports and port cities for states and rulers and the reasons why they frequently poured vast resources into maritime infrastructure projects.*

Traiter des infrastructures portuaires à une échelle de plus de deux mille ans, entre l'Âge du Bronze et la chute de l'empire romain est en soi un exercice difficile. Quoique les deux dernières décennies aient vu nos connaissances,

longtemps limitées aux textes[1], progresser de façon considérable sur le terrain de l'archéologie, nous ne connaissons aucun port dans sa totalité, bassins et infrastructures à terre. Leur évolution est souvent très mal connue, et les données géo-archéologiques qui, seules, permettent de replacer un port dans son environnement et de restituer sa colonne d'eau et ses dynamiques sédimentaires, sont très inégales, quoiqu'en progression constante.

On ne pourra, dans les limites des quelques pages qui nous sont imparties, embrasser dans leur infinie diversité, qui en est constitutive, les infrastructures portuaires. Elles sont en tout lieu un compromis entre la culture (tradition et innovation) et les besoins propres à une époque et à un espace déterminés. Cette diversité est chrono-culturelle, mais aussi propre à la diversité des contraintes naturelles et humaines. Les ports les plus importants retiendront nécessairement plus l'attention, au risque de minorer le rôle et la diversité des ports de moindre importance, en particulier les « petits ports » que l'on commence seulement à découvrir et qui s'intègrent dans des systèmes portuaires encore peu étudiés.

Quiconque aurait en tête un port antique principalement caractérisé par des môles et des quais aurait de fortes chances de ne pas prendre en compte un grand nombre de ports, voire, pour certaines périodes, la majeure partie des ports de la Méditerranée antique. Les seules constantes en termes d'infrastructures sont en effet, dans les ports de commerce, l'existence d'espaces dévolus au contrôle par l'État de l'activité commerciale et à ses procédures, variables dans le temps et dans l'espace, et celle d'espaces de stockage, et dans les ports de guerre, les arsenaux. Dans tous les ports, la présence du religieux est forte, les dieux du polythéisme étant nombreux à protéger les navires et leurs usagers, mais aussi les communautés nationales dont ils étaient une composante identitaire forte.

Sous ses formes diverses, le port est très tôt un espace hautement stratégique. Tous les ports publics sont de fait placés sous l'autorité du politique, cité royaume ou empire, qui est aussi celle qui les aménage et y promeut sa propre image. Port de guerre, il est le lieu à partir duquel s'exerce un pouvoir sur l'espace maritime et littoral. Port de commerce, il est l'outil d'approvisionnements essentiels à

[1] Les textes ont donné lieu à une synthèse ancienne, quoique toujours utile : Lehmann-Hartleben K., *Die antiken Hafenanlagen des Mittelmeeres: Beiträge zur Geschichte des Städtebaues im Altertum*, Leipzig: Dieterich'sche Verlagsbuchhandlung, *Klio, Beiheft*. Vol. 14 (1923) ; les synthèses archéologiques restent malheureusement encore rares. On citera principalement : Blackman D.J., 'Ancient harbours in the Mediterranean', *International Journal of Nautical Archaeology*, n° 11 (1982), 79–104 et 185–211 ; les n°s XV (2005) et XVI (2006) du *Journal of Ancient Topography*, tous deux consacrés aux ports ; Robinson D. et Wilson A., (eds), *Maritime Archaeology and Ancient Trade in the Mediterranean*, Oxford: Oxbow Books (2011) ; Keay S. et Boetto G., (eds), *Portus, Ostia and the Ports of the Roman Mediterranean Contributions from Archaeology and History. Meetings between Cultures in the Ancient Mediterranean, 17th International Congress of Classical Archaeology, Rome 22–26 sept. 2008* (= Bolletino di archeologia on line, http://151.12.58.75/archeologia/bao_document/articoli/) ; Keay S., (ed.), *Rome, Portus and the Mediterranean*, Londres: The British School at Rome, Archaeological Monographs of the BSR, 21 (2012) ; Keay S. et Paroli L., (eds), *Portus and its Hinterland: Recent Archaeological Research*, Londres: The British School at Rome, Archaeological Monographs of the BSR, 18 (2011) ; Keay S., Millett M., Paroli L. et Strutt K., (eds), *Portus. An archaeological survey of the port of Imperial Rome*, Londres: The British School at Rome, Archaeological Monographs of the BSR, 15 (2005).

la vie de la communauté qui le contrôle et une source importante de revenus douaniers, qui sont la contrepartie de la garantie et de la protection apportées par l'autorité politique aux transactions. Très tôt, peut-être dès le IIe millénaire, le port-entrepôt définit un espace irréductible à l'écoulement de surplus locaux en échange de produits nécessaires, et un modèle original de l'échange fondé sur la concentration de produits d'origine multiple dont seule une partie sera absorbée par le marché local, le reste étant échangé pour repartir vers d'autres destinations. Le port-entrepôt s'inscrit alors dans des réseaux spécialisés de navigation en droiture et de redistribution[2] très éloignés de l'image primitiviste que certains se font parfois encore du commerce antique.

Interface entre la terre et la mer propre à garantir à ses usagers civils et militaires une sécurité acceptable contre l'action des hommes et des éléments pour la durée nécessaire à son utilisation, le port a été susceptible de prendre des formes variables, qui ne passaient pas nécessairement par des infrastructures très remarquables, qui furent d'abord l'exception plus que la règle. Longtemps, les ports ont été placés de façon privilégiée dans des abris naturels (tels que le Lacydon à Marseille, le Pirée, les ports d'Alexandrie ou de Tarente), à l'embouchure des fleuves ou en amont de celle-ci, ou encore dans des lagunes ouvertes sur la mer. Les ports de la qualité la plus célébrée dans le monde grec étaient des bassins naturels, et certains, notamment les ports dits doubles, comme Milet, étaient moins des bassins que des espaces abrités par un cap de part et d'autre duquel on trouvait une protection contre la mer des vents dominants.

Des ports réputés être des ports de mer pouvaient se trouver très sensiblement en amont des fleuves : Arles, en Gaule Narbonnaise, Pergame, Myres et Xanthos, en Asie Mineure, ou encore Antioche de l'Oronte en donnent de bons exemples, tout autant qu'en Italie Aquilée, et surtout Rome, dont seule l'érudition moderne a nié une dimension maritime que lui reconnaissait sans hésitation un portulan grec (le *Périple* du « pseudo-Skylax ») compilé à partir de documents du IVe s av. J.-C. Le gain tant en coût d'infrastructures autant qu'en protection contre les agressions extérieures était considérables. Peu de cités maritimes étaient elles mêmes situées sur la mer. Les Grecs avaient du reste créé une désignation spécifique pour caractériser les relations d'un port et de la cité sous l'autorité de laquelle il était placé : *épinéïon*. Le Pirée est ainsi l'*épinéïon* d'Athènes, Ostie celui de Rome, Gravisca celui de Tarquinia, Pyrgi celui de Caere (Cerveteri), Kreusis celui de Thespies, Rhegma celui de Tarse, *Andriakè* celui de Myres, Elaïa celui de Pergame, ou encore Apollonia celui de Cyrène.

[2] Nieto-Prieto J., 'Le commerce de cabotage et de redistribution', in *La navigation dans l'Antiquité*, ed. P. Pomey, Aix-en-Provence: Actes-Sud (1997), pp. 146–159.

Les ports archaïques et classiques et leurs composantes

Le modèle du port aménagé s'est développé en Méditerranée selon un calendrier très variable dans l'espace. Les périodes anciennes de la Méditerranée sont mieux documentées que l'on ne pourrait le penser[3]. Il existait certainement en Égypte, dès la IVe dynastie, soit dans la première moitié du IIIe millénaire, des infrastructures de stockage associées à une activité portuaire et à une digue-débarcadère de plus de 300m de long, qui serait la plus ancienne digue connue à ce jour[4]. Au IIe millénaire av. J.-C., les fresques minoennes d'Akrotiri ne représentent aucune structure portuaire identifiable, et les poèmes homériques, qui mentionnent beaucoup l'échouage, n'évoquent jamais d'infrastructure portuaire. On connaît néanmoins à « Dor », en Israël, à l'Âge du bronze un « quai » associé à une colonne d'eau d'1m seulement. Ceci suggère que les navires venaient talonner au pied de cette structure, qui forme un littoral régularisé pour le déchargement plus qu'un quai d'amarrage *stricto sensu*[5].

Il faut remonter aux environs de 800 av. J.-C. pour trouver, à Athlit, au sud du cap Carmel, le premier môle connu de Méditerranée : il mesure 130 × 10m, est fondé sur un lit de galets allogènes (remploi de lest de navires ?) et est constitué de parements constitués de longues boutisses (2,2 × 0,7 × 0,6m) de grès montées à sec séparées par un blocage de tout-venant. Son extrémité tournée vers la mer porte une tour de 12 × 13m. Ces structures sont déjà des systèmes de défense autant contre les assauts des hommes que contre ceux de la mer. Toujours en contexte phénicien, le môle de Sidon, construit entre le VIIIe et le VIe siècle en blocs cyclopéens, atteint 230m. de long. À Akko (St Jean d'Acre), aux environs de 500 av. J.-C. sont construits, avec la même technique de boutisses, un môle de 330 × 12m et l'île artificielle qui supporte la « Tour des Vents ».

Les premiers môles définissent donc très tôt un espace protégé et signalé par une tour qui permet le contrôle de l'accès, l'identification du lieu et la communication éventuelle avec les navires. Dans l'état de nos connaissances, ils paraissent s'inscrire plutôt dans l'univers des monarchies orientales que dans celui de la cité de type grec, où leur apparition est à la fois plus tardive et plus discrète, et toujours liée aussi à des ambitions politiques.

Ce n'est pas avant la seconde moitié du VIe siècle que ces structures sont attestées dans le monde grec de la cité, notamment à Samos, où elles sont le fait du tyran Polycrate (538–522). Hérodote décrit comme l'une des trois merveilles réalisées au VIe siècle par les Samiens « une digue en pleine mer autour du port. Sa

[3] Voir en particulier sur ce point, Carayon N., *Les ports phéniciens et puniques géomorphologie et infrastuctures*, thèse de doctorat: UFR de Sciences Historiques (2008), Université de Strasbourg II – Marc-Bloch ; Sauvage C., *Routes Maritimes et systèmes d'échanges internationaux au Bronze récent en Méditerranée orientale*, Lyon: Maison de l'Orient et de la Méditerranée (2012).

[4] Tallet P., 'Ayn Sukhna and Wadi el-Jarf: Two newly discovered pharaonic harbours on the Suez Gulf', in *British Museum Studies in Ancient Egypt and Sudan*, n°18 (2012), pp. 147–68.

[5] Raban A., 'The harbor of the Sea Peoples at Dor', *The Biblical Archaeologist* 50.2 (1987), 118–126.

profondeur était de 20 orgyies (17m) et son développement dépassait deux stades (environ 400m). » C'est semble-t-il la profondeur exceptionnelle, au demeurant très exagérée (elle n'excède pas 10m au milieu de la passe actuelle) qui frappait l'historien. Il n'est pas très surprenant de trouver pareille structure à Samos, qui fut au VI^e^ siècle l'une des principales thalassocraties de Méditerranée, mais l'émerveillement d'Hérodote suggère que les môles de quelque ampleur n'étaient pas encore une composante très banale du port grec dans la seconde moitié du V^e^ siècle.

Les môles que nous avons décrits sont principalement de môles isolés (sauf peut-être à Akko). Les môles enveloppants paraissent commencer à se développer autour de, et paraissent être une des composantes possibles de ce que les auteurs grecs appelleront à partir du IV^e^ siècle le « port fermé » (*limèn kleïstos*). C'est également à la fin du VI^e^ siècle que l'on rencontre, avec le port Phénicien de Motyè, en Sicile, le premier port creusé artificiel archéologiquement daté[6].

Naturel ou artificiel, le port (gr. *limèn*) peut comprendre des espaces aménagés ou des bassins de plus petites dimensions pour le stationnement des navires (gr. *hormoï*). L'aménagement caractéristique du port de guerre est l'arsenal, désigné comme les « loges à bateaux » (*neosoïkoï*). Ce sont des ensembles de cales de halage cloisonnées et parallèles, couvertes d'un toit et vouées à accueillir chacune un navire[7]. Leur construction limite au maximum l'usage du bois par crainte de l'incendie. On connaît ces dispositifs en Crète à Kommos dès la seconde moitié du II^e^ millénaire avant J.-C[8]. Les principes de base de leur conception sont restés pour l'essentiel inchangés jusqu'à la fin de l'Antiquité, au Pirée, à Naxos, à Rome, à Marseille ou encore à Carthage ou Œniadaï. Ils sont associés aux dépôts et chantiers nécessaires à l'armement et à la construction de navires de guerre fragiles à la durée de vie limitée. Port de guerre et port de commerce sont distincts, car ils nécessitent des infrastructures spécifiques, mais leurs existences sont liées structurellement. La flotte est la garantie d'un commerce exclusif fondé sur le monopole national d'espaces de commerce identifiés.

Dans le monde de la Méditerranée pré-romaine, le commerce international est régi par des conventions entre États qui définissent les cadres du droit ouvert à des ressortissants étrangers de commercer dans des lieux étroitement définis, que les Grecs désignent du nom d'*emporion*. L'État, qui définit ce droit, définit aussi le ou les lieux dévolus à l'échange international qui s'effectue sous son contrôle et sous sa protection au prix d'un prélèvement douanier[9]. À l'intérieur de l'abri du port, l'espace dévolu à cette activité constitue d'ordinaire un espace identifié, parfois borné, l'*emporion*, et en dehors duquel l'échange perd sa légitimité et devient contrebande. Cet espace cosmopolite, antithèse de l'unité culturelle de la

[6] Carayon, N. 'Le *cothon* ou port artificiel creusé. Essai de définition', *Méditerranée. Revue géographique des pays méditerranéens*, 104 (2005), 5–13.

[7] Blackman D. et Rankov B., *Shipsheds of the Ancient Mediterranean*, Cambridge: University Press (2014).

[8] Sauvage, *Routes Maritimes et systèmes d'échanges internationaux, op. cit.*, pp. 68–69

[9] Bresson A., *L'économie de la grèce des cités. 2. Les espaces de l'échange*, Paris: A. Colin (2008), pp. 72–210.

cité, considéré à ce titre, déjà, comme une menace pour elle par les uns (Platon, Lois, IV, 704a), comme une chance par les autres (Xénophon, *Revenus*, 3.1–15), concentre les services nécessaires au grand commerce : douanes, banques, entrepôts et espaces institutionnalisés de l'échange, commodités diverses.

La première réflexion théorique de fond sur le port de commerce et ses équipements se rencontre peu avant le milieu du IVe siècle chez Xénophon (*Revenus*, 3.1–15 ; 4.40), un célèbre aristocrate athénien en rupture avec sa cité. L'auteur est d'abord soucieux d'optimiser le nombre des rotations (il a surtout en tête la lenteur des procédures, notamment en matière d'arbitrage des litiges). Il évoque ensuite la qualité des infrastructures dévolues au logement, à la vente et de négoce. Plus de rotations accroissent le volume des échanges, et donc le ravitaillement et les taxes perçues par la cité. Généralement d'un montant de 2% (*pentékostè*) *ad valorem*, ces taxes pouvaient rapporter à Rhodes un million de drachmes par an au plus fort de l'activité du port et étaient tombés à 150.000 drachmes après la création du port franc de Dèlos. Au IVe siècle, les *emporia* relevant de l'autorité du Thrace Kersobleptès lui rapportaient 200 talents (soit 1,2 millions de drachmes)[10].

Le volume d'activité atteint par certains ports a tôt conduit à organiser et à spécialiser les infrastructures portuaires. Le Pirée, aménagé à partir de 493 avant J.-C. sert de modèle intellectuel à la réflexion de Xénophon. Il donne l'exemple d'un port créé *ex nihilo* dans une baie naturellement protégée, à 8km de l'acropole, en exécution d'une décision politique prise à l'instigation de Thémistocle. Le remplacement de l'ancienne rade de Phalères par un port fortement aménagé ne s'inscrit pas seulement dans le cadre d'une réflexion utilitaire, mais aussi dans celui d'une symbolique politique qui est à la fois celle d'une thalassocratie naissante et celle de l'opposition du port à la ville perçue comme le lieu de l'aristocratie.

Espace complexe (militaire et civil, voué autant au transport des passagers qu'à celui des marchandises) distinct de la cité dont il dépend, le Pirée définit un espace portuaire fortifié, relié à Athènes par une route qui fut elle aussi fortifiée (les « longs murs ») peu avant le milieu du Ve siècle. Cet espace comprend un port de guerre (les loges des galères, les chantiers et les divers arsenaux) et un port de commerce à son tour organisé en espaces spécialisés, limités par des bornes, comme ce fut apparemment aussi le cas d'autres grands ports, notamment Alexandrie et Carthage[11]. Parmi ces espaces figuraient l'*emporion*, réservé aux opérations du grand commerce maritime, ce que l'on pourrait appeler un « bassin des ferries » (*hormos porthmeïôn*) dévolu au seul transport des passagers et aux navires spécialisés dans ce trafic, et un bassin public aux fonctions plus

[10] Polybe, XXX.31.12 ; Démosthène, *Contre Aristocratès*, 110. Cf. Bresson A., 'Italiens et Romains à caunus', in *Les Italiens dans le monde grec, IIe siècle av.J.-C. Ier siècle ap. J.-C. Circulation, activités, intégration. Actes de la table ronde, Écolenormale supérieure, Paris, 14–16 mai 1998*, ed. C Müller et C. Hasenohr, Paris: De Boccard (2002) (= *BCH Suppl.* 41), 156–162 ; Bresson A. , ' Les intérêts rhodiens en Carie à l'époque hellénistique, jusqu'en 167 av. J.-C.', in *L'Orient Méditerranéen de la mort d'Alexandre aux Campagnes de Pompée. Cités et royaumes à l'époque hellénistique*, ed. F. Prost, Toulouse: Presses Universitaires du Mirail (2003), (= *Pallas*, n° 62), pp. 191–192.

[11] Lehmann-Hartleben, *Hafenanlagen*, *op. cit.*, pp. 29–30.

énigmatiques (*hormos démosios*), peut-être réservé aux opérations de contrôle préliminaires[12]. Peu à peu les communautés étrangères les plus représentées dans le port (Égyptiens, Cypriotes) reçoivent l'autorisation d'y ériger, dans l'espace associé au port, les temples dédiés à leurs divinités tutélaires, exactement comme les Grecs en avaient eu le privilège à Naukratis et à Thonis-Héraklion, en Égypte, ou encore à Gravisca, l'*emporion* de Tarquinia, en Étrurie[13].

Par ses dimensions, le Pirée appartient à un petit nombre de grands ports, comme par exemple Naucratis, Héraklion-Thonis ou Syracuse, et peut-être Marseille. Les ports que l'on trouve à la même époque dans les grandes cités étrusques présentent une autre échelle : en dépit de flux commerciaux importants, les infrastructures portuaires du port étrusque de Caere, dont le sac par les Syracusains en 384 av. J.-C. avait pourtant rapporté un butin hors du commun, se limitent en l'état de nos connaissances à un port-canal d'une centaine de mètres aménagé dans le lit rocheux d'un fleuve côtier. Comme à Gravisca, l'existence dès l'époque étrusque de la digue qui existait assurément à la période romaine (d'une longueur de 200m à Pyrgi) reste à démontrer. Avant 300, le port de Carthage paraît se réduire à un port-canal.

En marge des ports juridiquement dévolus au commerce international (les *emporia*) qui en canalisent et organisent les flux, la redistribution intérieure et l'alimentation primaire de l'*emporion* sont assurés par un semis de ports « secondaires », irréductibles aux seuls « petits ports », mais interdits d'activité commerciale internationale. Ils définissent deux échelles du commerce : un commerce international entre *emporia* étrangers et un commerce/transport intérieur entre l'*emporion* et les ports secondaires relevant du même espace politique. Les bâtiments étrangers peuvent sous certaines conditions faire relâche dans ces ports, mais pas vendre ou acheter une cargaison, comme le montrent les traités romano-carthaginois de 509 et 348 av. J.-C. Au sein de cette catégorie de ports fermés au commerce international on compte aussi les petits ports, de village ou d'exploitation par exemple. Aux marges des *emporia*, toute une série de ports étaient en situation intermédiaire entre légalité et contrebande, à l'instar de Charax, dans la grande Syrte, à l'époque de Carthage (Strabon 17.3.20).

Les ports de la Méditerranée hellénistique et l'affirmation du pouvoir

La période qui sépare la mort d'Alexandre le Grand (323 av. J.-C.) de l'avènement d'Auguste en 29 av. J.-C. se caractérise en Méditerranée par une lente reprise après la crise des échanges aux V^e^–IV^e^ siècle, et par un contexte endémique de

[12] Hill D.K., 'Some Boundary Stones from the Piraeu ', *American Journal of Archaeology*, 36:3 (1932), 254–259 ; voir aussi *Inscriptiones Graecae* I², 887B.

[13] Bourdin, S. 'Fréquentation ou intégration : les présences allogènes dans les *emporia* étrusques et ligures (VI^e^-IV^e^ s. av. J.-C.)', in *Espaces d'échanges en Méditerranée*, ed. F. Clément, J. Tolan et J. Wilgaux, Rennes: Presses Universitaires de Rennes (2006), pp. 19–39.

troubles internationaux, dont le contrôle des mers et des littoraux ont constitué des enjeux militaires forts depuis la guerre du Péloponnèse. Celle-ci avait mis une pression militaire inconnue jusque là sur les mers (embargo et blocus, expédition de Sicile) et sur les populations littorales (razzias) et fait de la maîtrise des côtes un enjeu stratégique accru. Sur ce terreau d'instabilité et de conflits, la piraterie souvent encouragée en sous-main par les États, a prospéré et fait des agglomérations portuaires une cible attractive pour les opérations de razzia dont les pirates s'étaient fait une spécialité. Enfin, à partir de la fin du IVe siècle, les échanges à grande distance connaissent une reprise régulière à laquelle aucun aléa politique n'a mis un terme, et qui s'accélère après la mainmise romaine sur la Méditerranée dans la première moitié du IIe siècle av. J.-C.

Dans ce contexte hautement instable, les flottes de guerre sont devenues l'outil le plus stratégique de guerres qui se déroulent de plus en plus loin et passent nécessairement par la maîtrise de la mer. La mer est le vecteur par excellence du transport des troupes et celui du ravitaillement à grande distance. Couper ces lignes, ou priver l'État adverse de son propre ravitaillement (à commencer par celui, hautement stratégique, de la filière de la construction navale), c'est prendre une option sur la victoire. Les États sont dès lors confrontés à une véritable course à la fois au nombre d'unités, et au tonnage, qui n'est pas sans impact sur les infrastructures. Un grand nombre de petites unités était nécessaire pour assurer les patrouilles et le contrôle de l'espace maritime, les grosses unités étaient une réponse au développement de l'artillerie embarquée et terrestre. On voit donc apparaître des ports militaires hautement spécialisés, comme le *naustathmos* des thalamèges, ou « arsenal des avisos », à Schedia dans les faubourgs d'Alexandrie (Strabon, XVII.1.16).

Le nouveau port militaire de Carthage, construit vers 160 av. J.-C., est une merveille de logistique qui permet de séparer entièrement le port commercial et le port militaire. Il consiste en un bassin circulaire de 325m. de diamètre pour 2m. de colonne d'eau, entièrement artificiel, accessible seulement depuis le port de commerce, par un étroit goulet. Au centre se trouvait une île pourvue de 30 loges à bateaux d'où il était possible d'observer sans être vu les mouvements d'une flotte ennemie. Autour s'ouvraient d'autres loges à navires, pour une capacité totale de 170 navires de guerre[14], ou de 220 navires, d'après Appien, suivant Polybe (Appien, *Libyca*, 96).

La nécessité croissante d'un dispositif fort de maîtrise des littoraux a également induit la création d'un semis de ports de guerre-relais. À partir du IVe siècle se développent en Méditerranée les forteresses maritimes associées à des ports ou d'abris qui permettent d'assurer à une cité l'autorité nécessaire au monopole du commerce d'une zone au profit de son *emporion* (ou de ses *emporia*) et de prévenir l'installation sur les côtes de contre-pouvoirs qui viendraient

[14] Hurst H., *Excavations at Carthage. The British Mission II.1. The Circular Harbour, North Side. The Site and Finds other than Pottery*, Oxford: Oxford University Press (1994), p. 39.

lui disputer cette autorité[15]. Les fondations de Marseille[16] entre les Pyrénées et les Alpes et les « colonies maritimes » de Rome[17] (par ordre approximatif de fondation Antium, Tarracina, Ostie, Minturnae, Sinuessa, Sena Gallica, Castrum Novum, Pyrgi, Alsium, Fregenae, puis, au IIe sècle, Puteoli, Salernum, Volturnum, Liternum, Sipontum, Buxentum, Crotone, Tempsa). Ces colonies ont privé les cités préexistantes de l'autorité qu'elles avaient sur leur infrastructure portuaire. On sait par ailleurs qu'après la punition infligée par Rome en 166 av. J.-C., Rhodes conservait les revenus douaniers liés à l'activité de son port, mais avait perdu son autorité politique sur celui-ci.

Les exigences sécuritaires ont donné lieu à une nouvelle conception des ports, y compris de commerce, dans un contexte dominé par les progrès de l'artillerie, inventée à Syracuse en 399 av. J.-C.[18], et de la poliorcétique. Celui-ci doit être protégé des agressions extérieures et son accès organisé de façon à en permettre un meilleur contrôle.

Une entrée étroite, susceptible d'être fermée par une chaîne ou par une porte et protégée par des tours portant désormais de l'artillerie (dont la portée est de plus ou moins 700m), et un chenal d'accès sont autant de dispositifs qui transfèrent au port la conception portes fortifiées. Le port artificiel réalisé à Séleucie de Piérie pourrait illustrer l'un de ces dispositifs, si tous ses éléments sont bien d'époque hellénistique, ce qui reste l'objet de discussions[19]. Celui-ci il utilise l'embouchure d'une rivière qui a permis de développer un bassin semi-creusé de 400m de diamètre, rendu accessible dans un second temps par un canal coudé long de 800m fermé par deux portes, précédé d'un avant-port limité par deux môles artificiels de pierre de taille long de 100m et épais de 10m. La datation de ces divers éléments reste malheureusement très imprécise, quoique les technologies mises en œuvre pour les môles, en particulier l'usage de blocs cyclopéens (jusqu'à 10m de long) évoquent plutôt la période hellénistique.

La fermeture du port de guerre devient une caractéristique majeure du port de cette période, que l'on retrouve aussi à la nouvelle Cnide, au cap Triopion, où un bassin fermé protégé par des tours a été aménagé au nord de l'isthme pour

[15] Arnaud P., 'Marseille grecque et les routes du commerce maritime' in *Les territoires de Marseille antique*, ed. S. Bouffier et D. Garcia, Paris: Errance (2014), pp. 185–213.

[16] Bats M., 'Les colonies massaliètes de Gaule méridionale: sources et modèles d'un urbanisme militaire aux IVe–IIIe s. av. J.-C.', in *Des Ibères aux Vénètes*, ed. S. Agusta-Boularot et X. Lafon, Rome:École française de Rome 'Collection de l'École française de Rome 328', pp. 51–64. La liste et la chronologie de ces fondations, qui débutent peu avant le milieu du IVe siècle, présentent encore quelques zones d'ombre, mais comptent sûrement : Béziers, Agde, Rhodanoussia, Le Brusc, Olbia (près Hyères), Antibes, Nice.

[17] Salmon E.T., *Roman Colonization under the Republic*, Londres: Thames and Hudson (1969), pp. 70–81 ; Salmon E.T. , 'The Coloniae Maritimae', *Athenaeum* 41 (1963), 3–33. La liste de ces colonies est donnée par Tite-Live, XXVII. 38:4; XXXVI.3.6.

[18] Ober J., 'Early Artillery Towers: Messenia, Boiotia, Attica, Megarid', *American Journal of Archaeology*, 91.4 (1987), 569–604.

[19] Erol O. et Pirazzoli P.A., 'Seleucia Pieria, an ancient harbour submitted to two successive uplifts', *International Journal for Nautical Archaeology*, 21.4 (1992), 317–327 ; Uggeri G., 'Seleucia Pieria: il porto di Antiochia sull' Oronte', *Journal of Ancient Topography Rivista di Topografia Antica*, 16 (2006), 142–76Carayon, 'Le *cothon* ou port artificiel creusé', *op. cit.*

accueillir le port militaire, le port de commerce étant aménagé au sud de cet isthme et communiquant avec le précédent par un chenal[20], ou encore à Carthage où le port militaire. Une peinture murale découverte sous les thermes de Trajan illustre un dispositif de fermeture du port par une porte comme à Séleucie[21]. L'opposition pratiquée par Strabon, sous le règne de Tibère, entre le contrôle hermétique du port d'Alexandrie sous les Lagides et son ouverture sous les empereurs romains oppose clairement deux conceptions du fonctionnement du port.

Le développement du port creusé, souvent de petites dimensions, est une application de ce principe de fermeture[22]. Il n'est pas en soi une innovation comme on l'a vu plus haut. Le modèle du port creusé, accessible par d'étroits et longs chenaux, se développe apparemment partout en Méditerranée : il est connu à Gummi (Mahdia, Tunisie), à Phalasarna en Crète (100 × 75m), à Leukè Aktè (100 × 100m, goulet de 70m), à Hadrumète (Sousse), ou au port rectangulaire de Carthage (400 × 150m, colonne d'eau de 2m), le « *Knyn* », créé 300 av. J.-C. en remplacement de l'ancien port-canal. À l'instar de la plupart des ports creusés, il était fortifié. On y accédait, avant les aménagements romains, par un étroit chenal de 20m de large et fermé par une chaîne (Appien, *Libyca* 96). Un vaste quai de déchargement, à l'ouest, assurait l'interface entre les aménagements *intra muros* et le bassin. Assez logiquement la plupart de ces ports, qui semblent datés peu ou prou des environs de et paraissent correspondre à un choix délibéré de contrôler étroitement l'accès au port, étaient fortifiées. Ce modèle est également très diffusé sur le Nil et dans les lacs du delta en Égypte. Entre 20 et 15 av. J.-C., durant la période de transition que constitue le règne d'Auguste, Vitruve (*Architecture*, 5.13) considère encore le port comme un lieu naturellement ou artificiellement fermé de telle façon que l'entrée en soit marquée par deux tours destinées à abriter les machineries des chaînes qui permettaient de fermer l'accès au port. Ce sont ces principes qui avaient présidé en 39 av. J.-C., dans le contexte difficile du blocus maritime exercé par Sextus Pompée, à la conception du Portus Iulius à Misène, très proche de celui des ports de Carthage : un étroit chenal donnait accès à un premier port commercial, d'où un chenal artificiel conduisait au lac Averne, transformé en port de guerre (fig. 1)[23]. La fermeture du port hellénistique, tant matérielle qu'administrative ou militaire, bien décrite pour Alexandrie, a certainement contribué à ralentir le trafic, rendant nécessaire l'accroissement du tonnage, en dépit de colonnes d'eau qui demeurent modestes.

[20] Bresson A., 'Naviguer au large du cap Triopion' in *Anatolia Antiqua* XIX (2011), pp. 395–409, fig. 5.

[21] La Rocca E., 'The Newly Discovered City Fresco from Trajan's Baths', *Imago Mundi*, 53 (2001), 121–124.

[22] Carayon, 'Le *cothon* ou port artificiel creusé', *op. cit.*

[23] Viggiani C., '*Portus Julius: A complex of Roman infrastructures of late republican age*', in *Geotechnics and Heritage: Case Histories*, ed. E. Bilotta et al., (2013), Londres: Taylor and Francis, pp. 243–261.

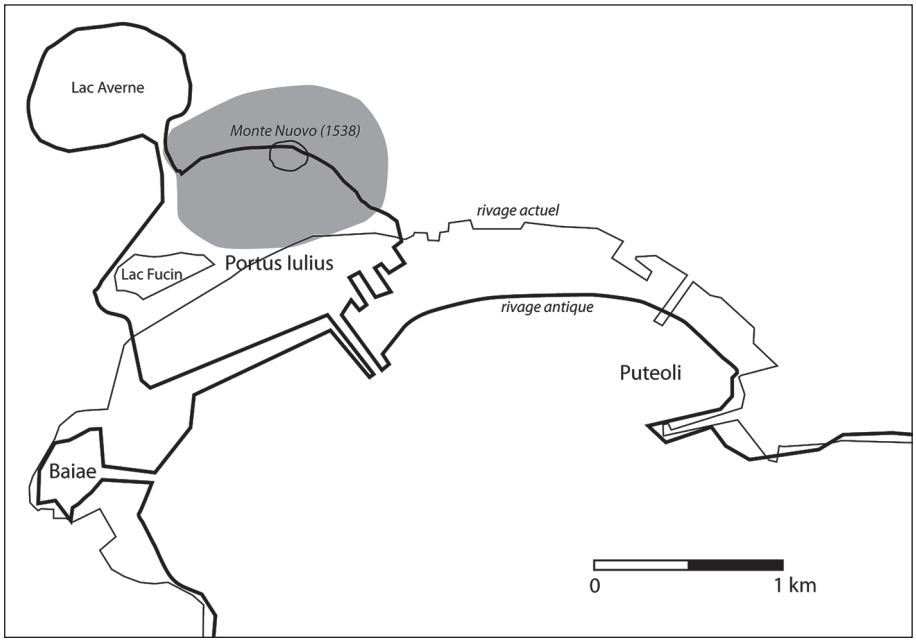

Fig. 1 *Plan sommaire du portus Iulius, et des ports de Baïes de Pouzzoles (dao P. Arnaud)*

L'accroissement du tonnage est une donnée encore mal maîtrisée dans le détail, mais une tendance à peu près assurée, même s'il ne fait aucun doute que les petites embarcations sont restées majoritaires en nombre. Les céréaliers de référence de l'Egypte hellénistique, les *kerkouroï* sont des navires allongés (rapport 1 :7) à propulsion mixte (voile et rame) qui portent entre 250 et 480 tonnes de blé. Ce type de navire a sans doute constitué, sinon un type exclusif de gros navire, du moins une référence du IV^e^ siècle à la fin du II^e^ siècle av. J.-C. Adapté aussi à la remontée des fleuves, de tirant d'eau limité au regard de sa capacité de charge, mais latéralement instable, il était particulièrement adapté au talonnage (attesté à Thasos et suggéré par les fouilles du port de Marseille) plutôt qu'à l'amarrage proue à quai caractéristique du début de la période suivante.

La nécessité d'une colonne d'eau plus importante est attestée à Naples où le port a été l'objet de la plus ancienne opération de dragage archéologiquement attestée, entre 300 et 250 av. J.-C. Une roue embarquée de 5m de diamètre munie de godets dentés de 1,65 à 1,80m de large a permis d'approfondir le port et d'atteindre une colonne d'eau d'au moins 3m en faisant disparaître les niveaux de fond du port antérieur. Ce fut une opération unique qui, selon les secteurs, paraît s'être prolongée jusque vers 150 av. J.-C., après quoi le processus de comblement reprend lentement, mais sûrement, même au plus fort de la fréquentation du port. Des dragues (plutôt que des Marie-salopes) datées du I^er^ siècle ont été coulées dans le port de Marseille après avoir été utilisées pour approfondir les ports.

Elle conduit un certain nombre des cités fluvio-maritimes à se doter de ports à l'embouchure des fleuves, à la fois pour ne pas se voir contester la maîtrise de

leur accès et pour organiser une zone de rupture de charge sous contrôle de la cité située en amont pour les navires gros porteurs qui auraient été incapables de remonter le fleuve. Ces places sont devenues des enjeux stratégiques majeurs. Les royaumes rivaux tour à tour leur offrent l'autonomie municipale ou les restituent à la cité dont elles dépendaient pour mieux s'assurer leur fidélité.

L'accueil de ces grosses unités permettait de réduire le nombre de rotations de navires à volume de marchandises égal, mais imposait une organisation accrue des ports, un accroissement des capacités et une amélioration de la gestion de l'espace. Au III^e^ siècle, une loi malheureusement mutilée de Thasos[24] organisait par secteurs l'accès à différentes cales de halage qui pourraient bien être le lieu de déchargement et de chargement des navires, en fonction de la capacité de charge des navires (un minimum d'une centaine de tonnes, selon la valeur du talent utilisé en référence, pour une des cales, un nombre inférieur entièrement hypothétique pour la seconde).

Avec le traité de Philon de Byzance, rédigé dans la seconde moitié du III^e^ siècle av. J.-C., malheureusement perdu, la conception et la construction des ports deviennent un domaine spécifique de l'architecture et l'objet d'une réflexion théorique spécifique. La réalisation du port d'Alexandrie, dont l'organisation est désormais bien connue[25], illustre bien le développement atteint par cette réflexion. La construction à travers la mer d'une chaussée de plus d'un kilomètre entre l'île de Pharos et la côte, l'Hepstade, a artificiellement reproduit le modèle du port double : l'Eunostos à l'ouest de l'île, le « Grand Port » à l'est. Deux chenaux ménageaient dans cette chaussée une communication entre les deux ports. C'est dans le Grand Port que se concentrent les infrastructures qui définissent ce qui devait devenir un modèle de référence du port (en particulier celui du port de Claude à *Portus*). L'Heptastade, Pharos, et un système d'îlots et de récifs délimitent un bassin principal de plus de 220ha ; la passe est divisée en deux par une île, selon un schéma qui se généralise sous l'empire romain à en juger par l'iconographie ; des bassins artificiels aux dimensions de ports limités par des jetées intérieures définissent des espaces spécialisés et accroissent les longueurs de quai ; une tour commande et signale l'entrée du port : le célèbre phare d'Alexandrie ; enfin, en même temps que les images royales sont associées à l'entrée du port et au phare, le palais s'installe au cœur même du Port, près du centre géométrique du bassin du Grand Port.

[24] Boetto, G., Carsana V. et Giampaola D., 'Il porto di Neapolis e i suoi relitti', in *Arqueologia nàutica mediterrània*, Girona: Generalitat de Catalunya, Departament de Cultura i Mitjans de Comunicació (2009), pp. 457–470.

[25] Empereur J.-Y. 'Du nouveau sur la topographie d'Alexandrie (note d'information)', *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, n° 146:3 (2002), 921–933 ; Goddio, 'Héracleion-Thonis and Alexandria, two ancient Egyptian Emporia', in *Maritime Archaeology and Ancient Trade*, *op. cit.*, pp. 129–135.

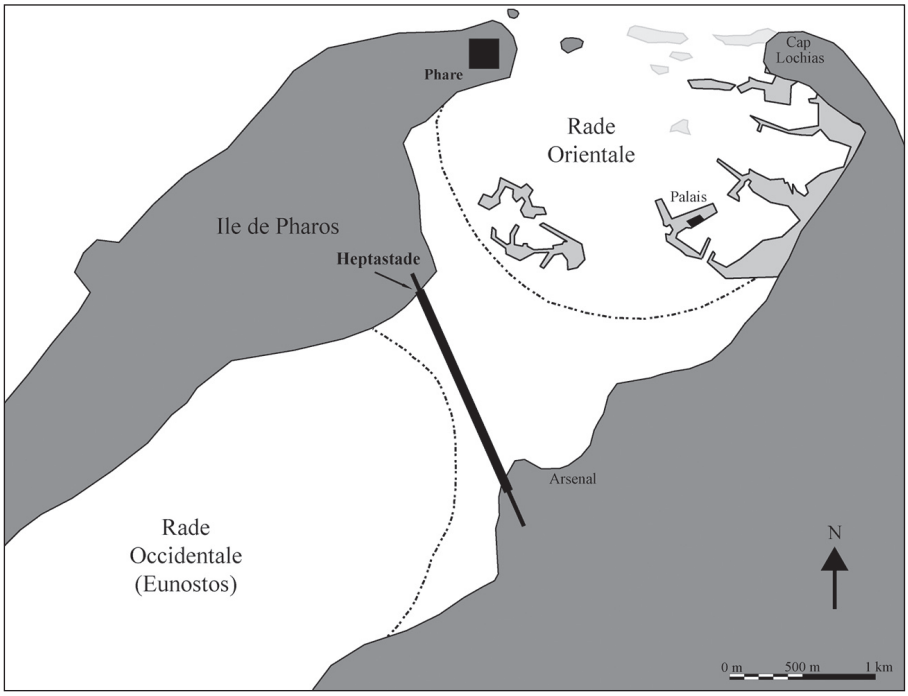

Fig. 2 *Plan sommaire du port d'Alexandrie sur la base des investigations de J.-Y. Empereur et F. Goddio (dao C. Vittori-Vilette et P. Arnaud)*

Le port royal d'Alexandrie (fig. 2) devient ainsi la vitrine du pouvoir royal. D'autres cités telles que Rhodes ou Carthage suivent cet exemple. Le port tend à être le lieu où se concentrent prouesses techniques et monuments de prestige (à Rhodes, le fameux colosse). L'exemple de Délos est de ce point de vue très intéressant. Alors que l'île a été un centre commercial de premier plan en Méditerranée, mais un centre politique inexistant, ses infrastructures portuaires apparaissent réduites à leur plus simple expression, comme s'il existait un lien nécessaire entre pouvoir et développement portuaire. Le port d'Alexandrie ou le colosse de Rhodes ne deviennent pas seulement des modèles. Ils créent durablement des défis à dépasser.

Les ports de la Méditerranée romaine impériale :

La période impériale se caractérise par plusieurs nouveautés majeures :

- l'unification politique de la Méditerranée
- le développement universel d'une civilisation urbaine génératrice de besoins nouveaux et de pôles de consommation nouveaux, notamment aux frontières où les militaires sont de gros consommateurs

- une économie intégrée qui développe la spécialisation et les interdépendances à grande distance
- un trafic maritime inégalé en volume, générateur de revenus, et protégé
- un régime politique fondé sur une relation nouvelle entre l'empereur-dieu et les cités qui regroupent ses sujets dans une relation à la fois religieuse et paternaliste
- une ingénierie nouvelle et une culture de la prouesse technique

La combinaison de ces facteurs fait la spécificité des infrastructures portuaires romaines impériales.

Cette période a combiné les technologies d'assèchement et de travail en milieu humide (caissons de bois coulés batardeaux et palplanches) deux innovations majeures qui ont assez profondément révolutionné la construction des infrastructures portuaires : le béton hydraulique capable de prendre sous l'eau[26] et la voûte, qui sont deux « signatures » romaines. Ces technologies ont permis d'intervenir de plus en plus loin en mer et de ne plus dépendre du transport, de la manutention et de l'ajustement de blocs taillés. Elles ont banalisé la construction des môles dans des secteurs immergés, y compris à l'initiative de particuliers, et permis une extraordinaire densification des ports protégés par des môles. Le port de Torre Astura[27], sur la route entre Pouzzoles et Ostie, en donne un bon exemple.

Le port dont la construction a été la plus étudié sous cet aspect est celui de Césarée Maritime, construit par Hérode le Grand en l'honneur d'Auguste. Des caissons de bois dans lesquels était coulé le mortier, positionnés en mer et progressivement coulés ont permis la réalisation des môles. Ailleurs, on peut utiliser des batardeaux et palplanches, des pilotis, ou simplement la bonne vieille technique du navire volontairement coulé pour servir de fondations au môle. Le béton s'accompagnait ou non de parements, selon le contexte naturel et l'exposition à la houle.

La combinaison de cette technique et de la voûte a donné naissance à l'une des structures les plus typiques des ports romains : les *pilae*. Il s'agit de jetées construites sur des arcatures portées par des piles à l'instar d'un pont. Dans l'esprit de leurs concepteurs, elles devaient permettre d'assurer la circulation de l'eau et limiter ainsi l'ensablement.

La banalisation du béton de chaux a également favorisé le développement et la banalisation des parties aériennes des édifices : tours de signalisation, notamment pour marquer de jour et de nuit l'entrée des ports et permettre la communication optique avec les navires, portiques, etc...

[26] Felici E., 'Ricerche sulle tecniche costruttive dei porti romani. Note preliminari sul porto di Astura (Latina)', *Journal of Ancient Topography* 16 (2006), 59–84 ; Gotti E., Oleson J.P., Bottalico L., Brandon C., Cucitore R. et Hohlfelder R.L., 'A comparison of the chemical and engineering characteristics of ancient Roman hydraulic concrete with a modern reproduction of Vitruvian hydraulic concrete', *Archaeometry* 50.4 (2008), 576–590 ; à l'époque d'Auguste, Vitruve, *De l'Architecture*, II.6.1 ; V.12 s'est assez largement étendu sur l'architecture portuaire.

[27] Felici, *ibid.*

Le modèle économique social et culturel nouveau qui se développe avec l'empire romain a créé des besoins jusque là inconnus en matière de consommation et de transport. Le développement de mégapoles d'un million d'habitants ou plus, telles que Rome ou Alexandrie, suppose un volume de ravitaillement colossal. Si l'on s'en tient aux stricts besoins de la consommation des seules deux denrées de premières nécessité, le vin et le blé[28], il faut imaginer à Rome chaque année 2 000 rotations de navires d'une capacité de charge unitaire de 400 tonnes, ou de 8 000 si cette capacité se réduit à celle, plus commune, de 100 tonnes, le tout essentiellement, sinon exclusivement concentré à la belle saison. À cela, il convient d'ajouter les autres produits alimentaires : l'huile (au moins 26 000 tonnes par an), les salaisons de poisson (125 000 à 175 000 tonnes), la charcuterie, les légumineuses. Il convient aussi d'y ajouter les matières premières (métaux, textiles, cuirs, et, surtout, matériaux de construction) et les produits manufacturés (vêtements, artisanat, objets d'art et de décoration)... Les seuls chiffres de la consommation donnent le vertige. Que dire si l'on y ajoute l'ensemble des marchandises qui ont transité par un port qui fut aussi un port-entrepôt où des marchandises changeaient de main pour être réexpédiées vers d'autres destinations ? Les mégapoles exigent des bassins portuaires et une organisation à l'échelle de leur fréquentation : s'il faut en croire Tacite, en 62, un méchant coup d'ouest envoya par le fond pas moins de 200 navires, sans doute ceux qui étaient au mouillage, dans le tout nouveau bassin du port de Claude. C'est sans doute au moins le double de navires qui devait se trouver dans le port, à quai ou au mouillage ce jour-là.

Se limiter à l'image d'un trafic entièrement centré sur les mégapoles donnerait néanmoins une image très déformée du trafic maritime à l'époque romaine. Le développement d'une culture urbaine généralisée et de pôles de consommation énorme aux frontières, du fait de la présence de militaires au pouvoir d'achat significatif, a attiré des flux considérables de marchandises, notamment vers quelques ports de rupture de charge à l'articulation entre les grandes routes maritimes et les bassins de la Méditerranée ou à l'interface entre voies fluviales et voies maritimes.

Les exigences nouvelles n'ont pas seulement affecté le nombre des navires, mais leur conception et leur tonnage. Dans la catégorie des navires de moyen et fort tonnage, dès la première moitié du Ier siècle av. J.-C., le long *kerkouros* à propulsion mixte tend à céder la place à des navires à voile seule aux formes plus arrondies, plus stables et au tirant d'eau plus important qui deviennent le standard de l'iconographie du navire de commerce jusqu'à la fin de l'Antiquité. La colonne d'eau du port devient dès lors un élément discriminant pour l'accès à certains ports. Le halage n'est plus une solution naturelle, et la situation ordinaire devient le mouillage et le chargement ou déchargement étrave à quai[29].

[28] Tchernia A., 'Subsistances à Rome : Problèmes de quantification', in *Les Romains et le commerce*, ed. A. Tchernia (2011), Naples: centre J. Bérard, pp. 247–262

[29] Sur le *kerkouros*, cf. Casson L., *Ships and Seamanship in the Ancient World*, Baltimore et Londres: Johns Hopkins University Press (1995), pp. 163–166 ; sur les autres aspects techniques, cf. Wilson A., 'Developments in Mediterranean shipping and maritime trade from the Hellenistic period to AD 1000', in *Maritime Archaeology and Ancient Trade, op. cit.*, pp. 33–59.

De nouveaux conditionnements apparaissent, qui modifient sensiblement la conception du port. Les navires à *dolia*[30], des pinardiers organisés autour de grandes jarres, nécessitent le transvasement du contenu des *dolia* dans d'autres *dolia* situés dans des entrepôts, probablement par pompage. La distance entre la zone de stationnement du navire et l'entrepôt de destination devait être réduite.

La plus grande révolution connue par le transport maritime est sans doute celle qui, au IIe siècle vit l'émergence rapide du tonneau, avec pour conséquence une chute spectaculaire du nombre des amphores et des épaves qu'elles rendent visibles et protègent. Les tonneaux utilisés pour le transport sont des pièces considérables d'une capacité ordinairement située entre 900 et 1 150 litres[31]. Leur manutention devient donc complexe et ne peut plus se satisfaire d'une simple passerelle. Elle s'accommode moins d'un déchargement dans des allèges et impose l'accès à des équipements spécialisés de grutage.

Ces exigences nouvelles sont allées de pair avec une transformation importante des infrastructures portuaires et de l'aspect des ports. L'accroissement de la colonne d'eau (de 5 à 7m. à Ostie) a induit le développement des quais et des pontons.

Faute de place suffisante à quai, l'accroissement du volume des échanges a eu pour premier effet d'accroître la taille des bassins portuaires, rendus possibles par les nouvelles technologies mises en œuvre dans la construction des ports. Dans de nombreux ports, le déchargement se fait au mouillage à l'abri des môles, sur des allèges autant et plus qu'à quai. C'est en particulier le cas à Portus, le port de Claude près d'Ostie, dont le bassin ne mesure pas moins de 250ha. Le nombre de places disponibles à quai et l'intérêt porté par tous les acteurs à l'accroissement du nombre des rotations ont rendu ce système pleinement satisfaisant aussi longtemps qu'il reposait sur la manutention de petits conteneurs. C'est le cas des sacs utilisés pour le transport du blé depuis le navire, où il est généralement transporté en vrac, jusqu'à l'allège où il est mesuré avant d'être transporté à l'entrepôt. C'est aussi le cas de l'amphore, dont la forme et le poids (une cinquantaine de kilos) permettent à un portefaix de décharger un individu avec une cadence d'un peu moins d'une amphore pour 30 secondes. Le port de Trajan procède de l'intention évidente d'accroître les longueurs de quai. Cette conception nouvelle ne permettait pas seulement d'accroitre la sécurité (le vaste bassin de Claude, très exposé, restait sans doute un lieu dense de mouillage forain) ; elle répondait sans doute à la nécessité de gérer un nouveau conteneur : le tonneau, qui fut utilisé même pour le transport du blé. La nécessité de gruter ces conteneurs a probablement imposé d'amarrer de façon croissante les navires le long du quai et non plus étrave à quai, nécessitant

[30] Cf. le dossier consacré au sujet par *Archaeonautica*, n° 15 (2008), 113–197 et Heslin K., 'Dolia shipwrecks and the wine trade in the Roma Mediterranean', in *Maritime Archaeology and Ancient Trade*, *op. cit.*, pp. 157–168.

[31] Marlière E., 'Le tonneau en Gaule romaine', in *Gallia* 58 (2001), pp. 181–201 ; Marlière Eet Torres Costa J., 'Tonneaux et amphores à Vindolanda : contribution à la connaissance de l'approvisionnement des troupes stationnées sur le mur d'Hadrien (II)', in *Vindolanda. The excavations of 2003/2004*, ed. A. Birley et J. Blake, Hexham: Vindolanda Trust (2005), pp. 229–230 ; Chapmann E., Hunter F., Booth P., Wilson P., Worrell S. et Tomlin R.S.O., 'Roman Britain in 2008', in *Britannia* 40 (2009), p. 338 pour les tonneaux importés en Grande-Bretagne.

des longueurs de quai accrues et des installations adéquates, également nécessaires pour le déchargement des marbres. Il en est sans doute résulté une spécialisation accrue des secteurs du port.

Les technologies mises en œuvre ont fait de la construction de ports artificiels, à l'instar de la construction des routes et des aqueducs, une expression de la victoire de l'esprit sur la nature et une justification de la domination de Rome, de ses empereurs et de ses élites. Elles ont été largement diffusées, y compris dans le domaine privé. Le *Corpus juris civilis* et l'archéologie révèlent la banalisation des techniques les plus élaborées pour la réalisation de môles et des *pilae*, y compris dans un contexte privé[32], ce qui n'a pas lieu de surprendre exagérément si l'on sait le niveau que pouvait atteindre la fortune de certaines grandes familles. Même de petites agglomérations se dotent d'infrastructures portuaires. Capables de construire des aqueducs et thermes (même si l'ingéniérie faisait parfois défaut, comme en témoignent les lettres de Pline le Jeune), les cités, qui conservent ou recouvrent sous l'empire, sans préjudice de leur allégeance à l'empereur et à Rome, leur autorité régalienne l'étaient aussi de mettre en œuvre des infrastructures portuaires.

Les liens entre la construction des ports et l'empereur, sans être jamais explicitement formulés, sont étroits et complexes. Les plus importants s'inscrivent dans une idéologie des grands travaux. C'est leur ampleur qui en fait pour Flavius Josèphe (*Antiquité Juives*, XIX.205) une « œuvre royale » ; les inscriptions ne nous font connaître d'interventions qu'impériales. Le barrage et le détournement de fleuves comme à Séleucie de Piérie sous Vespasien ou à Leptis Magna sous Septime-Sévère en donnent quelque exemple. La construction du port de Claude à Portus était une œuvre si considérable qu'elle était jugée irréalisable par les conseillers de l'empereur (Dion Cassius 60.11), et a été comparée par Suétone (*Claude*, 20) à l'assèchement du lac Fucin, un autre des « grands travaux », qui mobilisa 30.000 hommes pendant onze ans[33]. Ce port n'est du reste pas celui d'Ostie, mais le « port d'Auguste à Ostie ». Trajan construisit non seulement un second port pour le compléter, mais aussi un port de délestage plus au nord, à Centumcellae (Civitavecchia). Les deux ports portent le nom de l'empereur.

La construction par le roi Hérode du port de Césarée Maritime/Sébastè, dans une cité homonyme de l'empereur, a nécessité le transport de 17.000m^3 de pouzzolane sur plus de mille milles nautiques, au moins autant de pierres d'origine plus proche, mais dont le transport, terrestre ou maritime avait un

[32] *Digesta* 19.1.52.3 (Scaevola, VII *Digestorum*) ; *Digesta* 43.8.3.1 (Celse, XXXIX *Digestorum*) ; archéologie : Felici E, 'Ricerche sulle tecniche costruttive dei porti romani. Note preliminari sul porto di Astura (Latina)', *Journal of Ancient Topography* 16 (2006), 59–81 ; Arnaud P., 'Maritime Infrastructure. Between Public and Private Initiative', in *Infrastruktur als Herrschaftsorganisation? Interaktion von Staat und Gemeinden im Imperium Romanum, Internationale Tagung 19–20 Oktober 2012*, ed. A. Kolb, Zürich (2014), p. 161–179.

[33] Suétone, *Claude*, 20 ; Leveau P., 'Mentalité économique et grands travaux hydrauliques : le drainage du lac Fucin aux origines d'un modèle', *Annales. Économies, Sociétés, Civilisations*48.1 (1993), 3–16.

coût, et 5 500m³ de bois pour la construction des caissons dans lesquels ont été coulés les éléments des môles[34].

Construire des infrastructures portuaires dans des cités était à la fois une expression du devoir général de l'empereur de veiller à la sécurité des marins et au ravitaillement, et une marque de faveur à l'égard d'une cité particulière. À l'instar des aqueducs ou des thermes, les cités avaient théoriquement la possibilité de financer leurs infrastructures portuaires, mais par une manifestation particulière de bienveillance, l'empereur pouvait lui offrir un port, un phare ou des entrepôts comme il pouvait lui offrir un aqueduc ou des thermes (Dion Cassius, *Histoire romaine* 69.5.3).

La construction des ports tend ainsi à être considérée sinon comme un monopole, du moins comme l'apanage ordinaire de l'empereur, au point que Néron pouvait considérer avec jalousie l'intervention de son gouverneur au port d'Ephèse (Tacite, *Annales* 16.23).

Autant et plus qu'à l'infrastructure portuaire, les cités sont attachées à la scénographie que constitue le port. Sous l'empire, le port devient une vitrine de la cité au point que celui-ci devient un thème de l'iconographie monétaire des cités d'orient et que le port devient un élément de l'éloge de la cité. Les portiques et les colonnes surmontées de statues des gloires locales et les monuments à la gloire de l'empereur deviennent les éléments d'un paysage portuaire port sur lesquels se concentre l'évergétisme plus que sur les infrastructures lourdes (entrepôts ou môles). Ils définissent un paysage portuaire dont la figure 3 nous donne un exemple assez clair.

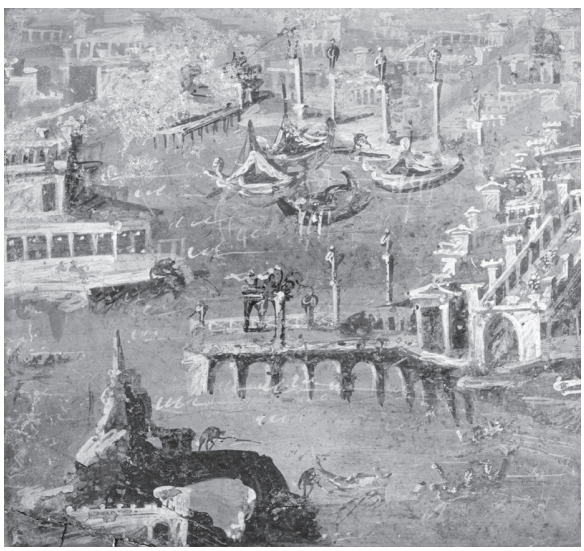

Fig. 3 *Peinture de Stabies*

[34] Brandon C.J., 'Roman Structures in the Sea: Sebastos, the Herodian Harbour of Caesarea', in *The Maritime World of Ancient Rome*, ed. R. Hohlfelder, Ann Arbor: University of Michigan Press (2008), pp. 245–54.

Un nouveau système hiérarchique se met progressivement en place avec l'empire romain qui a substitué aux douanes des cités (qui toutes n'ont peut-être pas disparu) de grands districts douaniers et des douanes extérieures. Au système emporial propre au monde grec se substitue un système fondé sur la distinction fondamentale entre le « port of clearance » où doivent être déclarés les lieux de déchargement et de chargement, les produits et leurs valeurs en vue du prélèvement douanier, d'une part, et les ports de chargement et de déchargement d'autre part, qui peuvent désormais être de petits ports[35]. Dans la première catégorie, les hiérarchies se fondent essentiellement sur la distinction entre des ports de rupture de charge ou ports-entrepôt où les marchandises changent de mains autant que de transporteurs et doivent être stockées, et les ports à vocation de terminaux régionaux.

S'y ajoute une multitude de petits ports associés ici à une agglomération, là à une villa, ailleurs à un atelier. La densification des sites côtiers et des appontements et abris est une caractéristique frappante de l'empire romain indissociable d'une sécurité accrue, sans doute, mais aussi et surtout de la densification des lieux du contrôle douanier.

La mise en place de ces ports a représenté un investissement important. L'entretien de ces ports, confrontés à un colmatage inexorable, a sans aucun doute été un problème majeur dont la crise économique et politique n'a sans doute pas facilité la solution. L'histoire de l'Antiquité tardive est celle de l'effondrement démographique des pôles urbains, de la réduction continue du tonnage, du renouveau du cabotage et d'un monde où les ports redeviennent une cible stratégique. L'histoire des ports de l'Antiquité tardive est encore à écrire. La destruction d'Olbia de Sardaigne par les Vandales, le démantèlement délibéré du bâti de *Portus* par les Byzantins sont les symboles de la fin d'une ère des ports de Méditerranée, et avec elle de toute une culture maritime.

[35] Arnaud P., 'Systèmes et hiérarchies portuaires en Narbonnaise', in *Archéologie des rivages Méditerranéens, 50 ans de recherche*, ed. X. Delestre et H. Marchesi, Arles: Errance (2010), pp. 103–109.

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CONCLUSION

Antiquity lends itself particularly well to the work of *Global History* in which *Océanides* has invited us to participate. More than simple juxtapositions of case studies to which Global History too often leads, this is an opportunity to examine the establishment of connections in the Old World and the impact of the seas on the development of societies and cultures which, since the dawn of time, have undertaken to make the seas an ally and a tool. As we have pointed out in this volume's introduction, chronological determination does not make it possible to compare comparable situations, because of the asymmetry of levels of political and economic development reached by the Old World and what constitutes, nearly a millennium after the end of Antiquity, "new worlds". As such, the attentive reader of this work will see that one must wait until the end of the pre-Colombian era to find situations in South America comparable to those that we know dating from almost two millennia ago in the Old World. Unfortunately, polarisation of the Old World is inevitable if one wishes to compare comparable situations. Documentary asymmetry also leads us to favour areas frequented by citizens of Mediterranean states. Not only did they leave behind a greater number of works which have long been studied, but maritime archaeology in its various forms, on land and sub-aquatic, which is a major source, has only recently been developed beyond the Mediterranean universe. Our knowledge of the Indian Ocean has progressed well over the last ten years, but remains still at its early stages. That of western Africa remains entirely unwritten. Interest in the maritime past of China is just beginning. For these reasons, a comparative approach to the whole of the Old World's ancient maritime history has become possible, but still remains highly unbalanced.

1. Maritime polarisation of ancient societies, and its causes

From Homer's poems to Lucrece's *Suave mari Magno*, ancient poetic imagery, as well as proverbs born of ancient wisdom, have always given rise to a repulsive image of the sea

and its moods: a place of confrontation with the elements, where the whims of Fortune exert themselves with particular cruelty, a deserted and hostile abyss where no law exists, the sea is a place of no return that deprives the dead of tombs and does not return the objects entrusted to it. But very early on, in the Veda, as in Homeric poems, another image of the sea appears, as a space filled with merchants, divided and ruled by convention, an engine of economic, intellectual and political development. The arrival of Ulysses at the isle of the Cyclops offers the gripping contrast between backward monsters that occupy an island which the Greeks immediately imagine transformed into a port city, along with the maritime trade benefits they would glean from it. Even the Cyclops's bludgeon arouses in them the image of a freighter's mast that, in a developed world, would be made of the same wood.

Far from primitivism, that has long been the portrayal of ancient navigation, the image that it gives us is one of surprising modernity. Even the ancients themselves relegated navigation by shore-hugging daytime sailing to the age of heroic myths. From the classic age, to sail day and night in a straight line was an extremely common practice, as were the tools called upon to durably structure maritime trade: bills of exchange, cheques, bills of lading, bank guarantees, bottomry loans... Long criticised, ships of Antiquity, in perpetual evolution, were above all else machines that met the needs for which they were designed. Two thousand years ago, they already ran monsoon routes. Well before that, they enabled the populating of numerous faraway islands in the greatest of the world's oceans: the Pacific...

Since your author has been studying naval history of ancient worlds, he has not ceased to be struck by lasting features which, despite many evolutions, relate it structurally to what we know of modern worlds, and create an astonishing link between the most remote periods and our times. Some of these connections are most certainly traditions of the western part of the Old World, which dominates in our documentation, and that also, through great discoveries, imposed its rules and usages on new worlds.

For a long time, our view on the relation of the cultures of Antiquity with the sea was doubly Mediterranean-focused: because we thought that ancient navigation was incapable of evolving outside of this space, and because relations with the Indian subcontinent and Southeast Asia remained pinned on an hierarchical, descendent colonial model of the Mediterranean, as though it gave orders to the Orient of the Old World. As research on the Indian Ocean in general unfolded, this image started to change and showed us a Tamil world endowed with a strong maritime trade organisation as far back as the 4th century, and China concerned quite early with its coastline. One imagines Red Sea ports teeming with Roman merchants, but written evidence points to an equal or greater presence of Tamils rather than

subjects of the Roman Empire. Likewise, where one would expect to see Roman ships arriving in Egypt laden with glassware, Indian crafts seem to have been predominant, in addition to spices and commodities from the Mediterranean world, some of which Eastern buyers considered luxury items. Though China was late in turning towards the sea, through erudition, we are learning more everyday about the maritime energy of the Indian Ocean. The sea and maritime outlets for land routes made the bridge between what was for Mediterranean people "Our Sea" and "the Great Sea" (the Indian Ocean). As for the Atlantic, from the Canary Islands to the Orkneys and the Baltic, it constituted an ever-more familiar navigational space, integrated into the commercial circuits of the Mediterranean Universe as far back as the 6th century B.C.

No Ancient society of the Old World was structurally and economically developed without the fertile breeding ground of the sea... We have known this for a long time about the Phoenicians and the Greeks, and it is even said of the Etruscans. But what is to be said of Rome and the barbarians from the West? In spite of appearances, exactly the same thing. Only the dubious historiography produced by Cato the Elder to extol Roman virtues portrayed Rome as a land-based nation battling corruption from the sea. The legend of Rome's founding runs through the sea, which leads Aeneas of Troy to the mouth of the Tiber. Etruscan Rome is, on more than one account, a maritime colony of Tarquinia. When the kings fell, the first known maritime treaty involving Rome dated back to the 6th century at the time of the emergence of its institutions and archives. In the times of Alexander the Great, well before the wars of Rome and Carthage, the Greeks observed Rome's maritime expansion with great interest, and knew in detail of Rome's attempt to establish itself in Corsica, for the sea was a concatenated whole. Around that same time, when, in the first Mediterranean portulan, a Greek described the coasts of Italy, he could recognise but one maritime city north of Campania: Rome, which since the 4th century B.C., had a fleet and arsenals, and was at the head of a maritime empire that included all of the Arno coast at the gates of the Bay of Naples and relied on an entire network of ports defended by fortresses... Barbarian principalities were developing on the grounds of trade control with the Mediterranean states. They, in turn, developed a very active port network on their oceanic front, as well as their own river and maritime commercial fleets, characterised by a specific technical context (sole plate construction for inland waterway craft, clinker-built for Atlantic ships).

Iranian, Persian, Parthian and Sassanian politics, even when guided by the great feudal lords of the satraps of the interior, are focused on the control of maritime outlets in the Mediterranean and in the Indus basin. The Palmyraneans of the desert were not only

caravanners. They also policed the water route of the Euphrates, to its outlet in the Persian Gulf. Petra, the "stone" of the desert was but the caravanner port of a maritime port: Gaza. And merchants from Petra, were very present in the largest port in Italy: Pozzuoli. China alone seemed to be an exception. This volume has nevertheless shown that this vision of ancient China must be nuanced, its maritime dimension is taking shape, and the ultimate commercial outlets of Chinese exports to the West remain the last maritime outlets to be analysed...

The maritime polarisation of people said to be "barbarian" follows this process. Seeing them as simple pirates certainly reproduces the subjective vision that the Greeks and Romans had of their relations, but that is too reductive a vision of their sphere of activity. From the 5th century, the people between the Ebro and the Rhone were heavily involved in maritime trade: in the second century B.C. there was intense activity of the indigenous river fleet on the Rhone from upstream to the ports of the Mediterranean. The Ligurians, described by Rome as archetypal savages, crossed seas to provide mercenaries to Carthage. Prior to the military operations of 180-190, they carried out maritime trade across great distances, up to Cadiz. To erase them from the sea, Paul-Emile had all of their pilots fall to the sword. Thus the memory necessary for sailing in this area of the sea disappeared along with them.

Around 75 B.C., the Belgians invaded Brittany and established themselves in the Temse valley. During the Gallic wars, Caesar was confronted by the imposing ships of the Morbihan Venetic fleet, with its specific architectural (clinker-built) traditions. Neither the status of maritime power, nor the tools required to guarantee it, were foreign to these barbarian people. With the "great invasions", newcomers who inevitably ran into a sea, quickly showed a marked maritime tropism. Once they arrived in the ports of the Black Sea, it took but ten years for the Goths to acquire a 20,000-ship fleet, by which they sowed destruction in the eastern Mediterranean. In the same way, Saxon raids at the mouth of the Rhine became a regular occurrence beginning in the third century, to the point where later Roman military vocabulary designated the two banks of the English Channel as "Saxon coastline". As we know, the Angles and the Saxons of Jutland, who crossed the Channel, ended up settling in the south and the east of England... The maritime polarisation of the barbarians was such that on September 24, 419, a constitution created by emperors Theodose II and Honorius killed anyone who taught barbarians shipbuilding techniques... The Vandals, who were excellent sailors, did not need to learn shipbuilding. They are known for largely destroying the port infrastructure of Italy and Sardinia and had the naval power to implement their policy. They destroyed facilities over which they hadn't the means to ensure lasting

control in order to deprive Rome of possible bases against their maritime power. The pressure they exerted on the sea was the basis for their growth in Andalusia and their settling in North Africa.

The reasons for maritime polarisation in the Old World since times immemorial are quite easy to show. Data on transportation costs indicate that around the year 300 A.D., it cost an average of 30 times more to transport a same quantity of merchandise by donkey as it did by sea. Transportation by wagon was even more costly. As for river transport, it was four times more costly than by sea when travelling with the current, and eight times more costly when travelling against it. The main reason for this difference lies in the size of the loads transported by a boat and in the number of trips made. However, for comparable lengths, progress in naval architecture lead to continued increase in the loading capacity of ships and increased these (cost) differentials seen in the Mediterranean at the end of the third century of the Christian era.

The absolute primacy of waterways, and among waterways, of sea routes over river routes, is fundamental to understanding the maritime polarisation of ancient worlds as well as the extension of this polarisation along the main river routes. The heavier the goods, and the lower their trade value, the less economical was their transportation by land. A tile produced in a workshop in Cavalaire did not travel more than two kilometres by land from where it was. On the other hand, its distribution by sea covered the entire western basin of the Mediterranean, all the way to Cadiz and Aquileia to the north of the Adriatic, passing through Tarragona, Carthage and Rome. However, silk and gemstones could travel long distances by land.

The sea therefore became the preferred carrier for transporting high volume products whose intrinsic value was not necessarily very high, but whose sales in a given high-demand area generated enough added-value to allow the merchant to live off his profits after payment of costs of transportation, customs and insurance (bottomry loan). This implied good management of backfreight and the emergence of lasting economic solidarity between distant lands. Rivers provided extension of maritime trade to the interior. In the second century B.C., large seafaring vessels (up to 700 tons) sailed up the Nile in winter to Thebaide and these shuttles (undoubtedly destined to form a bridge between the Mediterranean and a Red Sea in full swing), made up to two trips per month to Alexandria. When Hannibal crossed the Rhone he found an entire fleet of river boats upstream, ensuring the distribution of products that arrived through sea ports. The society of Lyon, under the Roman Empire, was that of a port, whose notables were of course very active in river transport. Moreover, some of them were

registered as maritime fleet owners in the main Italian ports... Very early on, the sea unfurled rivers like as many tentacles, as extensions of maritime activity and as vectors of the maritime polarisation of ancient trade.

Maritime trade was so advantageous that the Oceans--Atlantic or Indian--sometimes still considered by modern scholars as inaccessible to ships of Antiquity, are now seen as having been criss-crossed very early on by war and trade ships, well before the emergence of societies said to be "developed", and in the *barbaricum.* The first Roman voyages to the Canary Islands followed shortly after the fall of Carthage. Julius Caesar's first feat of arms remains little-known to historians. Occurring well before the short-lived invasion of Brittany, not only was it a marine battle--it took place in the Atlantic. The future dictator, having left the southern part of Spain - apparently from Cadiz -, skirted Lusitania at the head of a fleet, and rounded Cape Finisterre before engaging in a police operation on the coast of the Bay of Biscay, in Corunna, in a region that he entrusted to his adoptive son and successor, Augustus, in order to ensure and consolidate conquest. At the height of Roman power, the Empire's Atlantic front extended from Rabat to the Highlands and to the mouth of the Rhine. Going forward in time, commercial sea routes continued to develop, making commonplace the deep-sea routes from the Iberian Peninsula or the Aquitaine towards the British Isles and the North Sea. Cadiz was considered early on to be a simple appendage to the Mediterranean. As for the Indian Ocean, it became the place of extensive trade between the various economic players of the Old World, though they were deprived of direct commercial connections by sea.

The notion that the maritime economy was founded solely on the sale of surplus is an extremely naive vision of the economy compared to an economic reality that relied on a network of entrepot ports where one traded goods from various regions, a portion of which were re-exported, and on production specialisation that made it possible both to reduce prices at the time of sale and to meet needs of far-away markets. For example, one saw Etruscan bronze workshops set up in Athenian potters' workshops in order to produce for Etruscans or princes from Languedoc, according to the tastes of Etruscan markets.

Economic specialisation was made possible by maritime trade and its supply potential. To offer an appealing good was to guarantee attracting to one's port, ships whose holds were full of products their charterers knew they could sell. To offer an appealing good was to offer it at a price low enough for the merchants who resold it in distant markets, to gain substantial profits. To obtain low prices, one needed high volumes of specialised products. One therefore saw the implementation of development strategies based on intensive production of sought-after goods. This specialisation made it possible for a region to ignore the production of goods

necessary for its subsistence, which it could then find in its port markets. The regions in question were usually states, insofar as specialisation strategies, if not born of public initiative, required at the very least considerable state protection. Most of these specialised economies were based on an opposite and complementary flow of an essential product (such as wheat) and another good, most often wine, which quickly became a complement to meals as well as an essential social product. Thassos and Rhodes, then Rome and southern Gaul, thus threw themselves into intensive wine production, to the detriment of wheat, which had to be imported in an increasingly extensive manner. Wine, while once a generator of considerable profit for the majority of the known world, saw its price drop as it became commonplace and ceased to be a social marker, forcing producers to compensate for the drop in profits with an increase in volume.

The development of technologies for preserving meat and fish brought about analogous specialisations. Since the 6th century B.C., salting fish in their various forms, solid or liquid (they were widely used as condiments), gave birth to a true fishing industry, in particular that of pelagic species that slowly colonised the shores of the Mediterranean and the Atlantic, to the extreme limits of climatic limitations on processing (up to the coast of Armor). Imported salted fish became a part of the poor man's diet and spread to the country where it became, along with low-end wine, an essential component of inexpensive food for the forced labourer and the slave working in the fields.

Classic Athens provides an early example of an integrated economy: there, one consumed salted fish produced by the Phoenicians in the Rabbat region, wheat from Ukraine, Egypt, Sicily and Cyrenaica, and wine from the Aegean Sea. From there, crude and scented oils, finished products and silver bullion were exported.

These patterns of maritime interdependence are the *sine qua non* for the development of large urban metropolises, none of which were self-sufficient for food, and none of which really appeared outside the areas of maritime polarisation, even extending this area to include inland waterways. Feeding a mega-city such as Rome at the peak of the Empire required a number of vessel trips that makes one's head spin. To ensure the subsistence of its population at the poverty line, 350,000 tons of wheat, 260,000 hl of oil and 1.6 million hl of wine passed through the capital's port which translated to an absolute minimum of 790 vessel trips, each carrying 150 to 350 tons. If one added to that various drysaltry, legumes, and construction material, and if one also took into account lower tonnage ships, 1,500 annual vessel trips would appear to be the absolute minimum required to support life in this one mega-city. One

should also add to that the number of vessel trips required for the activity related to this huge bonding port. Sustained imports, active ports and well stocked warehouses guaranteed low prices, well-being and labour peace. Although this did not exclude hypothetical food shortages, it did make these port centres favoured sites, and made having a port, even a mediocre one, a key to economic development.

Moreover, the capital's model of civilisation, and its related consumer needs, were spread across the entire Empire. This model of urban life created the same needs amidst all urban hubs experiencing continuous growth within the Empire until pandemics put an end to this development. These urban hubs could not grow without some connection to the seas or rivers. As soon as piracy - particularly land raids - was brought back within acceptable limits, Antiquity showed some early examples of a dynamic of coastal urban hubs that one knows well from other periods in history. In the Mediterranean region during Roman times, Rome and Alexandria had close to or exceeded one million inhabitants, with Antioch at their heels, followed closely by Athens.

One could extrapolate this same model to extra-Mediterranean worlds. Wine, nectar of the Gods, gem of the Mediterranean, was often the interface tool between native *barbaricum* principalities and the Mediterranean world. The Burgundian princes of Vix, just as later on those of Denmark, were quick to assimilate the very elaborate rules of Greek and Roman banquets. Indian poetry came to appreciate wine, and the decorative cups made of imported gold that went along with its consumption.

One generally saw two trade spheres: one that was far-reaching, dominated by exoticism and by products with very high trade value that generated considerable funds between two worlds, and a trade whose profitability relied mainly on high volumes transacted within integrated regions. Mediterranean systems, endowed with their own dynamics, were thereby created. They were in turn divided into regional sub-systems that relied heavily on interior basins which in themselves were miniature Mediterraneans. "Mediterranean systems", but not a Mediterranean. In fact there existed a system suited to the Mediterranean, stretching to the Black Sea and the Sea of Azov at one end, and to a Larache (Morocco)-Cadiz line at the other. But this Mediterranean, which for a time was the "Great Sea" of the Mediterranean people, became "Our Sea" to the benefit of a new Mediterranean, the Indian Ocean. The Indian Ocean was in turn re-baptised the "Great Sea" and seen through the model of a closed sea, and in a way, a large Mediterranean. Indian tropism of the Red Sea (whose name is the Indian Ocean for all Ancients) was the great discovery of the last few decades: rice, coconut, teak and cotton, as well as the Tamil presence, were all characteristic of it. Even though they

were heavily travelled, the 150 kilometres of desert separating Myos Hormos on the Red Sea from Coptos on the Nile, which was the trading junction between those two seas, were a more manifest barrier than the 3,000 nautical miles that separated Myos Hormos from the coast of Malabar. In the same way, the Bay of Biscay and the British Isles, which the ancients saw as a closed sea, and the North Sea, were all Mediterraneans and consistent navigational spaces whose trading role must be re-evaluated well before the Roman conquest. One should also do the same analysis on the Bay of Bengal or the Banda or China Seas.

The highly specialised systems stemming from regional interdependence within these Mediterraneans were nonetheless quite fragile. The maritime economies themselves contained the roots of their fragility. The quest for the ever lower prices ultimately led to restoring profit margins by bringing together production centres and consumer basins. One therefore saw agricultural and manufactured products move from one maritime basin to another, and from the sea to the interior. The expansion of viticulture and the production of fine ceramics were good examples of this. In Italy and in the Rhone valley, one learned to copy wines from Chios... At best, protectionist policies could only delay this phenomenon.

2. States, seas and maritime violence

Trade development goes hand in hand with states' awareness of their maritime breadth. The sea was indeed a considerable source of revenue for states. Firstly, there were customs revenues. There were also often revenues of the owner-king. Even in a system dominated by free enterprise, the state intervened from time to time as a source of partisan trade, especially when its supply business was at stake, or when the sovereign himself was a trade player. It was the beneficiary of customs revenues generated by trade, revenues that were one of the main sources of revenue for states, which were compensation for guaranteeing and protecting business transactions. As far back as our document sources go, this revenue was the first chapter in states' receipts, along with the toll paid by the subject people. Right away, this situation put maritime states in a favoured position with respect to land states, even when the latter were home to first rate trade routes. Here again, maritime states did not have the privilege of customs revenue, but it was the volume of transactions as much or more than the intrinsic value of the traded objects, that prevailed. From the time of Socrates, the most open spirits of Athens, as well as the most discriminating, if not the most heard, pleaded for a treatment of foreign merchants that would make their port more attractive

than other destinations, in order to increase the volume of goods passing through their port, and with them, revenues for the city.

No matter how one looks at this problem, whether willingly or not, maritime trade development imposed a maritime policy upon states. First of all, one had to ensure control over the locations where international trade was legal, and prevent other states from setting up competition nearby. A clause typically found in commercial treaties forbade the contracting parties to found human establishments in an area defined by the other party as its sphere of authority.

Having authority over a place of commerce and obtaining the substantial related customs revenues, implied acquiring the means to establish this authority, and thence, to expand it. To do this, a first requirement was to ensure military protection of the claimed zone. This protection was applied at sea by having a fleet capable of ensuring that no seizure occur on all or part of the area claimed as a sphere of authority by a third-party state, and to enforce current rules on third party vessels within the zone. On land, a whole system of watchtowers and fortifications ensured monitoring of, if not control over, the coast.

An ancient author summarised the legitimacy of state violence at sea by referring to the maritime trophies displayed in Marseille "taken in naval battle, which the people of Marseille had to continuously hand over to those who fought them unjustly for the sea." To define an area where foreign ships could trade only in a limited number of ports - often, just one - and where free practice was limited to nationals, one affirmed "one's rights" on the sea by force and often through conflict with and to the detriment of those with whom it occurred, generally characterised as "pirates". This recurring characterisation opened the way to maritime violence whose magnitude often exceeded the standards set by the general rules of war, but in line with the challenges of controlling the sea.

A fleet was necessary not only for policing the seas, it guaranteed and delimited an area of authority which was a source of revenue; it guaranteed the rights of local merchants in distant regions. Maintaining a war fleet in turn implied a list of constraining requirements. By nature, a fleet was oversized in times of peace. One therefore usually found oneself with a mix of old pre-retirement ships that were aging poorly, and of a small number of new units that were greatly sought after. The fragile state of these ships implied control over the supply of several types of wood, whose sources might be far away. Few regions produced all the types of wood and raw materials required to make the various parts of a war ship: keel, planking, fastening hardware, standing and running rigging pieces, oars, rudder blades, sail linen, pitch, hull sealant, etc. The supply channels were often remote and justified creating a

maritime empire just to maintain a network for shipbuilding. But they also generated increased needs, especially wood from old tall forests. It was a vicious cycle. It is remarkable that the main Mediterranean marine empires (Athens, Alexandria, Carthage and Rome) were maritime powers that depended on far-away supply basins. Relying on an asset that existed only by the marine nature of an empire is a particularity of ancient maritime empires. Bringing Egyptian fleets up to standard required control over Lebanon and Cyprus, or at the very least cordial relations with these regions. To build its fleet, Rome at first tried to procure its wood in Corsica, then found its construction supplies through the conquest of Latium...

War fleets needed secure ports at their disposal. This security was both material and military. A port was not only an area protected from the sea. It was also protected from armies arriving by sea. Port development was inseparable from the coastal militarisation that went along with the development of maritime empires, and was also a tool for maritime expansion. Building citadels encapsulated in a potentially hostile and usually foreign environment was one of the basic tools of this process. The sea was a place of permanent tension in which everyone continuously tried to set foot in an area where they came into conflict with others. The foundation of the maritime policies of ancient worlds was first the result of the establishment of merchants who usually shortly preceded the permanent establishment of cities. Knowledge of an area and the sailing conditions around it, and also knowledge of trade and market basins, was in fact a condition necessary for a lasting establishment, which rarely occurred peacefully. Establishing network bridgeheads, particularly close to obligatory passages, over which one wished to ensure at least their use and, at most, control--that was often uncertain--was essential to this strategy and could lead to violent conflicts. Territorialisation of the sea and militarisation of the coastline were the bases for maritime treaty cultures. As far back as our written documentation goes, treaties placed clear limits on the coast beyond which navigation of war ships from the co-contracting country - except under specific circumstances such as meteorological constraints, ship damage, or flight when faced by a superior enemy - was forbidden, and therefore constituted a violation of the treaty and became a legitimate *casus belli.* The same treaties defined the conditions within which maritime violence could be exerted, as well as the rules of raiding. They also established the principles of territorial sovereignty which forbade the co-contractor from setting foot on the coast of the other party in order to found permanent human establishments.

The sea was in fact a universe of extreme violence. Defining maritime spaces was not easily done. They could be defined close to land by reference to a certain number of seamarks, as was done in the treaties. But they existed insofar as the treaties were adhered to. Beyond a coastal strip, albeit badly defined, overall the sea remained a space that was open, free, and to a certain extent, lawless. Piracy was a given. This vague and sometimes handy notion allowed he who defined the pirate to benefit from the law and in turn, strip the "pirate" of it. Piracy was latent in the high seas, but outside the routes characterised by movement of products with a high trade value, its predilection was less for boarding than it was for raiding. This explains the fact that only a lasting peace allowed human conquest of the coastline, which was also a condition for its safety and sustainability. "Endemic" piracy evolved considerably starting at the end of the 5th century B.C. The grounds for this development were in part in the emergence, with the Peloponnesian war, of all-out war that used the pressure on coastal populations as an element of war. Pirates became genuine maritime mercenaries and acted as moles for states not wanting to declare war in grand style. As for the economy born of piracy, it became an economic driver for numerous states. Under these conditions, only a universally maritime state (at least on a basin scale) could contain piracy and maritime violence in amounts permitting the development of coastal settlements. One of the distinct features of the ancient period was having known this type of situation in the Mediterranean area during peacetime Rome. This feature was called into question every time peace itself was. When the strength of the state waned, piracy came back to life, especially along routes where rich hostages and/or small volume high value cargo travelled.

Political peace was in fact one of the peace drivers for the sea, although it was not the only one. The development of a solid maritime infrastructure was a tool for peace, but only a tool: it deprived seafarers of their land bases and limited the impunity offered by deserted coasts or seas. The vicious cycle of maritime empires was only broken by an uncontested control of the coast, an implementation of infrastructure and a population settlement on the basis of which the virtuous cycle was created: past a certain threshold, frequenting a place became a security factor, but it was impossible without infrastructure. Building maritime independence occurred by taking control of this infrastructure. Ultimately, in a climate of uncertainty, independence was achieved by the pure and simple destruction of the maritime infrastructure belonging to those from whom this independence was sought.

States had great difficulty in continuously maintaining war fleets of significant size. It was all the more difficult to maintain transportation fleets to satisfy the needs of the state, whether the state was the buyer or seller of the goods transported. Even in the most authoritarian states, a strange game of negotiations evolved: a subtle mix of partnership, gifts and authoritarianism that ultimately sealed the power of the fleet owners. Without them, without their support, nothing got done. When one pushed authoritarianism too far, high volume trading across great distances faded, condemning regions to withdrawal. When price control policy was too stringent, trade collapsed along with profit margins. The economic thought process of ancient states was nonetheless extremely limited, and one saw only too often how local authoritarianism and turning rules into ideologies had dramatic consequences on trade. Trans-Mediterranean trade was ruined by two factors: considering the existence of different pricing from one end of the Empire to the other as unacceptably immoral, and setting price ceilings on all goods and services from one end of the Empire to the other, as Diocletian did in 301. The way in which the maximum price edict was treated by ancient authors--copies of which were systematically destroyed---suffice to illustrate the unpopularity of the devastating edict. Profits alone fed maritime communications…

Authoritarianism and discretionary power conferred upon the agents of power was the source of generalised corruption which was well analysed for the Roman Empire. Racketeering and abuse of power were the common lot of customs agents, soldiers in charge of ports and various state services. This resulted in halting the economy which reduced centralised power to an equilibrist game between its agents, guarantors of its interests, even though they were corrupt, and the protection of merchants and fleet owners without whom there was no fluidity in maritime trade, but who were no less disposed to swindle the taxman at the first opportunity... The rarer the merchant or fleet owner, the more he was courted, and the more he took unfair advantage, the more he was restricted. But the more he was restricted, the rarer he became... To the point where public authority went from enticing to requisitioning, where the vital need to maintain maritime trade connections won over the necessary acceptance of the providers' conditions for providing. In the end, the economic connections were never lost, the merchant ever triumphant. The state alone lost.

3. Internationalisation, cosmopolitanisms, identities, exchanges and transfers.

For a variety of reasons, the sea was the preferred carrier for individual and group travel. The great mass migrations were usually land migrations, and were also the most violent: this was the case of the Gauls who laid siege to Rome in the 4th century, and pillaged Delphi before crossing the Dardanelles and settling in Asia Minor, giving their name to Galatia. Group maritime travel was a more polished movement. But all were not necessarily peaceful. The oldest known treaties between contracting parties, controlled two phenomena separated by a fine line: raids and the founding of permanent outposts, the former sometimes being an open pathway to the latter. At the end of the second millennium, the raids in Egypt on the "people of the sea" and the Trojan War remind us of the temptation to establish oneself by sea on territories that were sometimes, but not always, devoid of people. Mycenians had founded permanent establishments all the way to the Nile Delta in this manner. Today we know that, well before that occurred, during the Neolithic period the first domesticated animal stock arrived in the west by sea, thus marking for some the beginning of "ancient proto-history". The founding of cities, characteristic of what modern scholars characterised as Greek or Phoenician "colonisation", was an essentially maritime phenomenon. Entire populations left their mother city first to found a new community in response to demographic pressure, as was generally the case for the oldest colonisation, and to create secured premises in key areas of maritime routes, as was the case for emerging maritime powers beginning in the 6th century B.C. But it was a very progressive phenomenon which was the sum of one-off initiatives, and not the massive phenomenon seen only at the end of the process.

Although the sea was the main carrier for mass transport, trips were not always made of one's own volition. The sea was also a means of deportation. The relocation of entire populations was used as a pacification tool. It was quite commonly in Rome. In 181-180 B.C., Baebius deported 40,000 Ligurians all the way to the Benevento region, in order to establish them in a depopulated zone of the plains, where they could settle without taking up arms. This sea operation was between La Spezia and Naples, and each deported person received a setup stipend of 150,000 denarii. Recourse to the fleet made it possible to accelerate the transfer process (and therefore the supply logistics) and, above all, to limit the risks of rebellion inherent in a column of 40,000 people travelling by land. The sea was also the carrier and the cause of most voluntary individual travel.

The sea was mostly viewed by the landlubber as corrupting: from Chinese philosophers to Plato and to Apollonius of Tyana, the sea was the object of widespread rejection by most of the Old World thinkers. The reasons for this rejection, all the more marked by increased maritime polarisation, were many: following the example of forests, the sea was, at least in appearance, a place of lawlessness, open to the robber and the merchant, who was but another form of robber (does not the same god, Hermes, protect both?). Demanding of those who used it, the sea turned away from the sage's thinking and the state's service; in the end, it introduced exotic luxuries and developed, against the founding identity of the political group, cosmopolitanisms whose scene exacerbated the consciousness of identity. The sea did indeed impose temporary travel (that of the merchant and the sailor) and more lasting travel (traders, port personnel, nationals interfacing with port organisation). Without monopolising port cities, cosmopolitanism was usually correlated to port activity.

Institutionalised cosmopolitanism was generally thought of within the construct of multiculturalism. Similar to a ghetto system, it isolated and juxtaposed communities by keeping them away from native populations. As a general rule, it was states' favourite way to manage cosmopolitanism, particularly, but not exclusively, city-states. It saw the foreigner above all else as a threat, and the cultural melting-pot as an irreparable degradation. Foreigners were most often confined to the area reserved for international trade, that the Greeks called an *emporion.* This precisely delimited space was the antithesis of the city and as such, was naturally located outside the city. In Carthage or Rome, for example, it was organised outside the city walls, at the foot of the Aventine Hill. Once they were established, diasporas organised themselves around national cults and founded entire neighbourhoods on national and/or linguistic bases. In this regard, there was great tolerance of principle, even in Athens where in the 5th century B.C., the Egyptians, then the Cypriots, obtained the right to build temples to their own gods. Under the Roman Empire, important port cities, and sometimes their guilds, maintained offices in the major ports.

Real-life cosmopolitanism tended nevertheless to also function in the more permeable mode of multiculturalism that cast the players of maritime trade in a business community and introduced products from other worlds, as well as their uses, into a space thought to be closed. The local cults that federated and foreign cults whose exoticism enticed were among the deciding factors in bridging communities, even if this appears to have occurred mainly within the social elite. Around 500 B.C., the Etruscan king of Caere himself gave the bilingual dedication (in Etruscan and Phoenician, probably Cypriot) of a sanctuary for Astarte / Ishtar, the most popular divinity in the Near East, at Pyrgi, the port of Caere. The Diana of Aventine

Hill was the Artemis of Phocaea and Marseille... A temple to Augustus existed in Muziris on the coast of Malabar. Others also existed, right in the Parthian political space, along the Euphrates route, where the Palmyraneans, who were Roman subjects, tested their skills in protecting river routes.

Phoenicians sometimes Hellenised their names; some Italians established themselves in Carthage, and their children took Punic names... Changing one's name while remaining identified as an exogenous element did not only promote integration. This practice illustrated a choice of identity: that of being a bridge between two identities in the cosmopolitan world of the trading port. Multiple citizenship increased during the Hellenistic era, and under the Roman Empire, foreigners living in a city acquired the rights and duties of that city's citizens, without losing their ethnicity. Interaction and the tendency toward mixing communities were growing traits of the Mediterranean region; they seemed all the more marked the more socially elevated the people. Or was it simply more visible?

Cultural adaptation phenomena are in any case very old and characterised all human groups without exception. Today, specialists of ancient Mediterranean history tend to substitute the notion of Hellenisation, which had long prevailed, with that of Mediterranisation, which defines a cultural integration of all maritime trade players in the Mediterranean region and an acculturation that reached all groups, and could not merely be reduced to a dominant model. This notion should also encompass all areas of maritime cosmopolitanism. The development of common cultural and linguistic footing most certainly enabled travel for societies connected by water. Gaul notables loved sending their sons to do their liberal studies at the best Greek institutions. After Alexander, Phoenicians held a rather impressive place in the Athenian educational system.

Historiographic tradition speaks a lot about "Athenian trade" or of "Roman trade" in the Indian Ocean, but these notions are largely a matter of opinion... There was trade to and from Athens, trade to and from Marseille, an Indian Ocean trade, but they were of a cosmopolitan nature, above all else private initiatives that depended on the promise of profit. Cosmopolitanism was consubstantial with ancient maritime trade. Clever is he who could identify the nationality of a wreck, as long as shipwrecks have existed...

Shortly before the middle of the 4th century B.C., a convoy of two ships left Piraeus, a port where porters were predominantly Egyptian, to load wine in Thrace bound for the mouths of the Dnieper, to there be loaded with return cargo of wheat bound for Athens. Neither of the ships was Athenian. One belonged to a Samian. It was chartered separately, on

the one hand by two individuals from Phaselis, a city close to today's Antalya, subject to the authority of the Great King of Persia, and on the other hand, by two Greeks from Halicarnassus, also subjects of the Great King. In Athens, the former took out a bottomry loan with two associated lenders, an Athenian and a Eubean; the witnesses to the loan contract were two Athenians and a Boeotian... The other ship, owned by the Phaselis individuals, was chartered thanks to a loan contracted with a Cypriote from Larnaca (Kition...). In other instances, a ship from Marseille transported wheat from Sicily to Athens...

The cultural contact and the resulting inter-mixing did not go smoothly and brought about identity-related tension. At the end of the 5th century B.C., an Athenian "nationalist" lamented both the cosmopolitanism of habits and customs that came with the arrival of goods from all over the known world and the emergence of a language that was no longer the Athens dialect, but a language hybridised by all communities active in the port... Several centuries later, on another boat, the crew of five labelled their ship china using three alphabets: two in neo-Punic, two in Greek, one in Italian... The sea that bound could also divide: within a single large port, Ephesus for example, trade allowed the emergence of a cosmopolitan elite, however fishing brought together people from the region based on their identity, whatever their class... Certain identities were created through trade and maritime travel. Thus the Italians, who in the second century B.C. did business in the Aegean Sea, found that they were Italian even though they spoke several languages and were subjects of Rome. A war against Rome for the recognition of an Italian state would result from this awareness, which was derived from trading.

The sea was also a place where common rules had to be established and had to take effect, beyond national standards, customary or written. A rule well-known to most legal historians is that maritime laws were fashioned by the users of the sea, and not by states, whose involvement was usually limited to integrating maritime uses within their own standards. This rule was for the most part forgotten in Antiquity, especially by historians of Roman law. This is a mistake. Treaties give a good idea of the existence of common bases whose origins go back to time immemorial. The fact that the maritime treaty between Rome and Carthage was Greek in its form has long been highlighted. This form actually broadly reproduced stereotypes existing long before the Greek world, found in ancient Near East documentation... In the same way, one loved saying that there was no Roman law of the sea, but a general Roman law that was applied to the sea. The customary maritime law was in fact integrated into the judicial system and formalised under the name of "Rhodian law", a name

which was still used for the collection of maritime laws and rules circulating in Mediterranean regions in medieval times... As for specific contracts typical of chartering (bills of lading), they were exceptions to the law, treated as such within the formalised framework of general law.

Very early on, common practices spread within the maritime space, allowing partnerships between members of different communities. Since the 5th century B.C., the "barbarians" of Languedoc and Catalonia wrote contracts in Greek or in Etruscan.

In the Mediterranean universe prior to the Roman Empire, maritime trade, often being international by nature, implemented a great number of treaties that were less the politico-military treaties often made of them, but treaties that defined the conditions of a reciprocal and legal maritime trade, the legal framework within which it would be treated, and the cases of violation liable to prosecution as well as those constituting a *casus belli*.

Stoics, who up until the end of the third century of the Christian era constituted a spiritual camp very close to power, developed a philosophy of progress founded specifically on the notion of trade. There was every reason to think that following the example of the Saint-Simonians in the 19th century (one thinks specifically of their role in developing "overseas" colonialism and the building of the Suez Canal), they inspired or influenced public policy in terms of communication and maritime infrastructure. In the Far East and in Southeast Asia, Buddhism played an analogous role in spreading a positive image of trade, and consequently in the development of trade itself.

For one of these stoics, Strabo, progress consisted of making better use of the benefits of Providence, or even becoming the tool for Providence or Providence itself when, as was done in Rome, engineering and the treasures of intelligence redress the deficiencies of nature. Progress was only possible once the vicious cycle of violence--of banditry and piracy in particular--was broken. It was the role of strength to break this vicious cycle and substitute it with a virtuous cycle based on trade, business and the city. From business came peace, policy and standards, all sources of progress, and intellectual, material, spiritual and moral development. The sea incarnated the ideal picture of this trade, and more than any other means of communication, brought together what nature pulled apart. Thus we end up with a systematic opposition of two universes: mountains, symbol of isolation and backwardness, and the sea, symbol of openness and progress, so long as peace lay at their intersection.

Technology transfer: the world of naval technology

Naval technology illustrates technology transfer quite well. Assembly techniques and architectural ship design evolved toward growing standardisation, at least for the large constructions. The ligature assembly technique (the "sewn" boat), that appears to have been a marker in traditional Greek naval construction, disappeared in favour of assembly by lug and mortise, which originally came from the Phoenician world. Hull shape began to homogenise. Anchor topology, initially very varied, was unified by the 4th century, and underwent the same evolution throughout the Mediterranean region: adoption of lead anchor stocks, then the simple lining of wood anchor stocks with lead, then iron anchors with moving stocks... Lead hull lining appeared and disappeared in a relatively homogenous fashion, probably in favour of the discovery of an antifouling coating. The local types, such as the Egyptian *baris,* disappeared in favour of universal types, such as the *kerkouros,* a trade galley with mixed propulsion that one saw in all of the Mediterranean from the third to the first century. It disappeared in a synchronous fashion in the Mediterranean basin in favour of a small number of major types of ships, usually with wind propulsion only.

Once navigation horizons expanded, this homogenisation phenomenon followed suit. The ports of the Red Sea have thus delivered numerous examples of ship bottom elements used in domestic construction. The ships were in all respects assembled according to the model of Mediterranean ships, and their sails were of the same design - except for two sizeable details: the wood used for the hull was teak, and the sails were made of cotton. These ships were manufactured in India, a country of sewn boat tradition... Although maritime technology tended to be stamped with the seal of tradition for small fishing and coastal shipping boats limited to a restricted navigational space (at the end of the first century A.D. the ship from Comacchio, that flowed up to the mouth of the Po river after having been loaded at Aquileia, remained a sewn boat even though it incorporated more recent techniques), imitation appears to have been an important evolutionary vector among the seafarers evolving in a larger cosmopolitan space. Large public and private maritime and port infrastructures also became a commonplace. Ports were the subject of architectural manuals starting in the 4th century B.C. Lighthouses followed the same movement.

Other technology transfers were well known in maritime worlds. Potters were exporting, sometimes very far away, thanks to the sea. A whole series of vases that were long thought to be exported from Italy to India, and that we know today were produced in India, did not only imitate italic form, but implemented a technology that resisted, and still today resists imitation; potters must have undoubtedly travelled with their know-how. The volume

of maritime trade contributed to the exchange of aspects of lifestyle with distant countries and to their unification in the Mediterranean area and.

The sea also contributed significantly to the modification of ecosystems. Even though we are just beginning to show interest in the impact of maritime trade on the environment, we can easily measure its magnitude. The consequences of development on forest cover, and consequently on the ground, on alluviation and on coastal morphology were considerable and were due to at least three reasons. The first was extensive development of farming and breeding for export purposes, on land taken over from forests; the second was the pressure exerted on forest cover by port infrastructure and by naval construction. Imagine for a moment the canal port of Narbonne: two dykes each 3 km long and 50 m wide resting on an uninterrupted pattern of trunks driven vertically into the ground like enormous piles. Elsewhere, casings and cofferdams used for concrete jetties had the same impact. The third was the possibility of shipping wood across great distances that could spread the pressure exerted on forest cover to areas very far away from their place of consumption. In the 4th century, the cumulative pressure on flora coverage was such that the emperor had to import heating wood, necessary for life in the capital, from Tunisia to Rome. Thermal baths in particular were an important marker of civilisation during the Roman Empire. In the 4th century, public thermal bath houses covered an accumulated surface area of more than 30 hectares of the city. Buildings, baths and saunas were heated 365 days a year... Here again, the cost difference between land and marine transport allowed bringing substantial quantities of wood from distant lands. Wood material also travelled over great distances. Alexandrian fleets were built with imported wood. In the 160's of the Christian era, a ship would arrive from Side into a port on the Nile Delta carrying a load of 22 pine trunks...

Maritime activity was surely not the only cause of deforestation, but it contributed to it considerably. It resulted in the increased instability of slopes, whose soil degraded to the point of disappearing, and in certain areas, in unparalleled land erosion. In Asia Minor, a person could see the coastline recede by one kilometre in his lifetime; in Frejus, the coastline receded by seven kilometres in 600 years... Maritime activity was also a race staged against the coastline. The heavier the marine infrastructure, the greater its impact on the environment. Often, it spelled their doom.

In short, one cannot underestimate the impact of product migration to consumer centres. We have observed the trend of product and agricultural know-how migration. Wine slowly conquered the entire Mediterranean basin. Rice took its place in the Danube basin, and

the silk worm was imported to the Mediterranean region in the 4th century. The rabbit, initially confined to the Balearic Islands, spread into the Mediterranean region with the same consequences as in Australia later on. It is difficult at present to give an opinion on the effects of the industrialisation of fishing and on the existence of possible overfishing phenomena.

But the sea was also an essential carrier of new ideas. It opened up new lands where one could glean inspiration from new thought systems and ways of life... The space of Greek colonisation thus made of "Great Greece" - the name given to the colonies of southern Italy - a form of America before its time, where utopian works came into play, outside the limits of an old world deemed to be antiquated. So it was that Pythagoras developed his thought and his sect in Italy, at the interface of the Greek and barbarian worlds, which inspired and enriched him, far from the tyranny of Samos. For him, it was the place where everything was possible. Once again, it was in Great Greece that the Panhellenic dream was to become reality in the 5th century with the founding of Thurii on the ruins of Sybaris - not totally devoid of imperialist ulterior motives on the part of Athens.

Since the archaic period, it was fashionable for Greek thinkers to progress intellectually through contact with Egypt. Solon, Herodotus and Plato all made the voyage to Egypt. It was indelibly inscribed in Greek culture up to the time of the Roman Empire, as an essential educational moment for those who had intellectual or philosophical ambitions. During the 5th century, these horizons moved bit by bit toward India. The philosopher Democritus of Abdera based his *Great World System* on his trips to Egypt, Ethiopia, and mostly to Vedic India, from where he was the first to bring back the teachings of the Brahmans, the famous "gymnosophists" who made a permanent mark on the Western conscience, to the Mediterranean region, and even created a few followers there. The Indian Ocean and its gods, unknown to the western world, continued to fascinate the collective conscience. The same quest led Apollonius of Tyana to India and Ethiopia in the years 60-70 of the Christian era. At the end of that same century, the fantastically wealthy Cleombrotus of Sparta chose to sail the routes of the Indian Ocean with merchants, to form his own personal impressions of these regions. In the 6th Century, the Alexandrian Cosmas, first author of Christian geography, visited Ethiopia and took the surname Indicopleustes, meaning "the one who sailed all the way to India". We might think that the opening of trade routes brought practices from these distant horizons within everyone's reach. Not at all.

Because these distant voyages, which were all over seas, were not free. To finance their trips, most of the travellers used (and generally squandered) their personal fortunes, or

became chance merchants on maritime trade routes. They followed trade routes, which were familiar to seafarers though exotic to landmen.

The sea was the principal means of travel for the philosopher, curious about the world, or the preacher, with a fairly wide denomination incidentally, that included the wider sphere of "Cynics", among whom one often found Christians. The Apostles never stopped travelling, mainly by sea. A cynic philosopher known by the name of Proteus, at one time a Christian and even a martyr before adopting a philosophy similar to that of the Brahmans, ended up setting himself on fire with the flame of Olympia during the opening of the 165 Games. By becoming an apparently well followed Christian preacher, he also symbolically changed his name to Peregrinus: the traveller, everywhere a foreigner. Nevertheless, travel took place by sea whenever possible.

But the sea was not only the carrier of those with new ideas. It was also the grounds upon which new divinities and religions took root and developed. Seafarers were religious and superstitious people. They turned the ship into a veritable floating sanctuary, placed under the explicit guardianship of a divinity and protected by a thousand and one rituals, sacrifices, objects and other charms. As for the port, it was the space for all votive cults at the outset, and for giving thanks upon arrival for the realisation of their wishes. In the context of polytheism which dominated the ancient Mediterranean, we cannot be surprised by the propensity of seafarers to adopt foreign divinities or to assimilate known divinities with foreign ones. With their paraphernalia of superstitions, they contributed to the spreading of new cults. Neither can we be surprised to see the aura that prediction donned in the maritime universe, especially for the casual maritime traveller, starting in the 4th century B.C. based on the dual grounds of Judeo-Egyptian esotericism in Alexandria and of Latin and Etruscan religious sensitivity. This prediction was that of the soothsayer or the astrologer, of course, but it was also that of those who, by the accuracy of their predictions, demonstrated their divine inspiration, be they a thaumaturgist like Apollonius of Tyana or his contemporary Paul the apostle, who both predicted shipwrecks and the destiny of those on board. They were considered revealers of the religious system and of the God to whom they gave voice.

The cosmopolitanism that was the heart of maritime cosmopolitanism undeniably promoted the spreading of comprehensivist religions. It was in maritime trade environments that the Isis cult developed in the second century B.C., which was a religion of salvation that one encountered in all ports of the Mediterranean. Isis was an expression of Fortune as well as the Lady of Waves, and promised salvation to her devout. The link between maritime trade and the expansion of Buddhism in Southeast Asia and China contributed to the development

of maritime trade in Buddhist groups and to the development of Buddhism in merchant societies. Eastern religions first developed in maritime trade environments under the Republic and at the beginning of the Empire. Among them, Christianity held a prominent spot. The map of Christianity, prior to Constantine and even earlier to the great missions of the end of the 4th century, merged with that of Empire ports: Ephesus, Smyrna, Corinthia, Carthage, Rome, Marseille, Arles and even Lyon, river beachhead of the Mediterranean.

Port connectivity alone did not explain everything. There were also sociological reasons for this deep-rootedness. In the case of Christianity, the map of the Jewish diaspora is has long been an explanation. It is undoubtedly not the only one. Like eastern religions, primitive Christianity was structured in small groups that shared a common ritualistic and initiatory experience, as well as ritual banquets. These two formal characteristics made these groups *thiasoi* in the eyes of the ancients. Belonging to these religious micro-societies tied to the common experience of the initiated spread around the known world created universal duties of fraternity, a common trait among all Universalist religions of Antiquity. Strictly from the point of view of network construction, initiatory cults and *thiasoi* certainly played a considerable role. The extended family or the professional environment formed the framework for proselytism, and each of these *thiasoi* (or Churches), offered a fraternal welcome in a distant port to members of far-away *thiasoi* devoted to the same cult. Primitive Christianity especially emphasised the protection due to its fellow traveller. The purpose of these constantly changing "religious fraternities" seems comparable to that played by the freemasons in the building of maritime trade networks of modern Europe: at once a networking tool, and a place for proselytism.

4. An unsettled sea at the beginning of geographic knowledge

The knowledge the ancients had of the sea, in particular of distant seas, by all accounts was based less on exploration than on trade. From the time of the pharaoh Necho in the Antonine era, ancient authors referred to a certain number of explorations that were all explorations on exterior seas, which likely accounted for the image of the earth that those who made reference to it wanted to validate. The existence of some of these explorations is very doubtful. The *peripli* of Carthaginian explorers Hannon and Himilco were apparently forged with the intent of providing a narrative form for anonymous information retained in the collective memory to give credence to hypothetical phenomena or geographical

configurations. Likewise, the *periplus* of Pytheas, like that of Hannon, was considered by many ancient authors to be a collection of pre-existing routes and extrapolations based on astronomical knowledge, repackaged in story form. Grand expeditions at the behest of states are finally relatively few in number. In 325, Alexandre sent Néarque to reconnoitre the coast between the mouths of the Indus River and the Persian Gulf. Between 118 and 115, Eudoxus of Cyzicus made two voyages between the Red Sea and India, the first one on a personal and business basis, without going through Somalia, and the second, at the order of Cleopatra III, passing through Somalia on the return trip. Shortly after the fall of Carthage in 146, Polybus made reconnaissance of the Atlantic coasts of Morocco on behalf of Scipio. In 15-16 B.C. Germanicus entered the Baltic from the North Sea. A little more than sixty years later, between 77 and 84, a certain Scribonius Dimitrius of Tarsus was finally sent on a geographical mission to circumnavigate the isles of Britain... Missions were also a source of information. In particular, the mission of Megasthenes in India around 200, the mission sent by the Indian kings to Rome under Emperor Augustus, and the mission of Sri Lanka to Rome under Claudius made considerable contributions. But above all, the recurring and corresponding testimonies of merchants provided a new view of the world in the long run.

The traders' trips were indeed ordinarily very repetitive, along an established trade route. For example, the Phrygian merchant from Hierapolis (Pamukkale) says that he rounded Cape Matapan 72 times in his lifetime while travelling to Italy, which undoubtedly represented 36 round trips. Therefore, seafarers must have only had a limited geographical awareness of the routes they took. Nevertheless, diasporas communicated information both on the world they left behind to those with whom they resided, and to the motherland about the new world in which they had established themselves. The Tamils who were set up around the Red Sea and at Aksoum in Ethiopia, the Mediterranean people set up on the coast of Malabar, the Arabs of the peninsula, the Sri Lankans passing through Rome, the Nabataeans of Petra set up at Pozzuoli, and the Palmyraneans of the Indian Ocean were purveyors of knowledge who made Chinese historians marvel at the boundaries that marked off Roman routes, without ever a Chinese having laid eyes on them. By word of mouth of the sailor and the traveller, information was passed on and ended up building information gathered by the landlubber, written down in strip charts and portolan sea charts, and eventually used by geographers...

The matching testimonies of traders allowed for a surer evolution of world knowledge than many explorations, as they generally followed a discovery rather than preceded it... The number of witnesses validated their testimony. Roads along the shores of the Atlantic Ocean and crossings offered routes considered commonplace from the beginning of the Empire.

Chinese historians knew the sphere of activity of merchants from Ta-Tsi, which extended, so we are told, all the way to Cochinchina. But they knew it only second hand, just as they knew the "Sea of the West" (Red Sea) only second hand. Merchants indeed talked among themselves. One therefore learned from a Greek source that the Arabs of the peninsula knew routes from Africa to Zanzibar... In this way, a view of the world was formed, from trader to trader, from written report to geographer, from mission to mission. From the 4th century B.C., expeditions described the Mediterranean, the Black Sea, and the Atlantic all the way to Mogador. The emergence of the Roman Empire and the development of relations with distant people changed.

The idea that Central America was discovered by Roman ships has been very much in vogue outside the scientific community over the last few years. The hypothesis that ships ever reached there, carried by trade winds, is not without foundation. The fact that the ships then found their way back is infinitely more doubtful. The idea that exchanges could have resulted therefrom is, from our present documentation, a romantic fantasy.

On the other hand, maritime routes known by the Mediterranean people at the end of the second century of the Christian Era extended into the Atlantic of the Canary Islands and the Azores, frequented since the Phoenico-Punic times, to Scandinavia and the Orkneys, described since the middle of the first century B.C. as going through Ireland, and the Indian Ocean, from the Red Sea to Zanzibar - or even further south - and at least to Cochinchina. For those people, knowledge of China was based on land routes and it was only through extrapolation that it was lent a marine coastline. The Chinese on the other hand knew the sphere of activity of people from Ta-Tsi (a name designating first Roman, then Arab, Levantine and Egypt) well, but this knowledge no longer stirred up more than marginal curiosity in the Chinese world, as Ta-Tsi was at the margins of the Shan people formerly part of their world. The existence of a huge Mediterranean space beyond the Ta-Tsi and the Sea of the West does not appear to have much preoccupied historians who were more interested in the origin of the exotic products they imported than a view of the world. Worlds connected by the sea, without knowing each other directly, expanded further, to China and Japan, where a pearl of glass produced in the Roman Mediterranean was recently discovered. The same phenomena took place in the Mediterranean region during the Bronze Age. Here again, the sea caused the limits of the world to change.

One of the common traits of ancient navigation, no matter the sea, was navigation essentially without instrumentation: even the most simple nautical charts, compasses,

astrolabes and logs were not part of on board equipment or the sailors' intellectual world of empirical navigation, were they from the Pacific, the Indian Ocean, the Mediterranean or the Atlantic.

Nevertheless, the empirical knowledge of navigation was developed on the same grounds as astronomical and geographical knowledge. Knowledge from the dawn of navigation across the Pacific without instrumentation today serves as a model for reflecting upon cognitive processes in play during navigation without instruments.

The sea of the Ancients was, in reality, not completely "compass-less". Being without a compass does not mean losing the north, especially when the compass and the cognitive processes linked to it were not part of the ordinary learning process. Sense of direction, which may be governed by other cognitive processes, was however not alien to this space. From the Pacific to the Atlantic, societies of Antiquity had an intimate knowledge of the Heavens. Some Mediterranean people believed the invention of astronomy dated back to the Phoenicians and to their navigational practices. Homer traces nocturnal navigation by the stars back to Ulysses - as good as saying to the dawn of time: the hero having learned this from Calypso. The number of days and nights of sailing (on average five from Rhodes or Crete to Egypt, the same from Narbonne or Marseille to North Africa) was so common in the 3rd century B.C. that Eratosthenes of Cyrene referred the time when one knew how to practice only coastal shipping as the Heroic Age. Direct off-shore trade relations developed in Antiquity, not only in the Mediterranean area, but also between the Cantabrian coasts and the British Isles, between Bab el-Mandeb and India and among the Pacific archipelagos. The Heavens pointed north (or south). Constellations visible from one location, along with their height on the horizon, made it possible to empirically estimate latitude which, even though it might not necessarily be expressed in degrees and minutes of arc, nonetheless made it possible to situate oneself to the north or south of another location or along the same parallel as that location.

Centuries of sailing experience collected by seafarers, enriched with every passing generation, transmitted from one captain to the next and sometimes put into writing, not only opened a path to a more or less vague knowledge of once unimagined worlds ever further away, but served as the foundation for the first Euclidian representations of space, at least for Mediterranean peoples (the Greeks, Romans and Arabs). Unlike on land, with pathways marked by visual landmarks providing a source for a linear and "hodological" view of space, the sea, particularly the high seas, required the spatial construction of a desert with no visual markers. One could cross the sea repeatedly, going directly from point A to point B when the

winds were favourable, and travel through points C, D or E when the winds demanded it (the Greeks referred to such detours as the “second route”, leading to the modern proverbial expression “Plan B”). This required directional tools and an intimate knowledge of space, which was the privilege of the most fascinating individual on board: the pilot, keeper of knowledge of time and space in which he evolved, of knowledge of the sky, of the sea and the vessel.

At the beginning of the Empire, the author of the Indian Ocean expedition (known as the *Periplus of the Erythraean Sea*), wanting to relate the discovery of the monsoon, which he attributed to a skipper, said that he conceived of the direct route by imagining the map of the coasts travelled many times between Bab el-Mandeb and the coast of Malabar in his head. Without representing the individual experience of a single man, this story summarises the collective experience of the emergence of the map of the world as we know it.

As far back as the sources of old world history go, the approximate duration and direction of routes are in fact etched into the collective memory of maritime populations. They were the first cognitive tool for the imaginary construction of space. The sea thus became the tool not only for knowledge of the world, but also for its two-dimensional representation. Crossing times said to be normal under defined navigational conditions (on a freighter sailing downwind, or on a trireme...) were familiar to maritime cultures of Antiquity. They provided a large standardised group of commensurate data that made it possible to compare spaces, to develop an idea of distances between two locations in a straight line along the coast, and therefore to picture capes and gulfs, as well as the approximate direction of the path between these two locations. Herodotus drew up conversion tables for this distance data: (downwind by day: 600 or 700 furlongs; nycthemeral periods: 1,000 furlongs) in the Mediterranean, in the 5th century B.C. Starting with Timosthenes of Rhodes, an admiral of Ptolemy II, the distances thus obtained rendered a map of the known world based on the seas, though it was not possible to orient even the most precisely measured land routes in a satisfactory fashion. Hence it was from the evaluation of maritime distances that the first Euclidian representations of the known world were born: those of the Mediterranean, then those of neighbouring oceans, those of Eratosthenes of Cyrene in the third century B.C. in Ptolemy, at the height of the Roman Empire.

From the "Bitter Sea" of the Babylonians to the *samudra*(s) of Vedic India, going through Homer's and Eratosthenes's Ocean, the known world was usually perceived as an insular universe. The exterior Ocean, river or sea according to the area, times and cultures,

delimited the real world from fiction, actions of real men from myths. When the Ocean became the outer sea, frequented by real men, it also became the tool for acquiring new information that pushed back the limits of the world. Reality could then overtake fiction and created insurmountable conflict using the most commonly accepted models for representing the known world.

The scale of the inhabited world was affected by the expansion of trade on the outer sea. But this type of discovery did not always occur without strife. The world traditionally conceived by the Mediterranean people was an island completely contained in the Northern Hemisphere. Eratosthenes of Cyrene's map tried to include the numerical data taken from Alexander's conquests with the Homeric model of this northern island. As long as it was only a question of extension from east to west, this vision was not deeply threatened. However this was not the case for the extension to the south of the known world. The nature and position of Taprobana (Sri Lanka) in one or the other hemisphere was the source of great geographical worry. The mission that came from Taprobana to Rome under Claudius confirmed that it was truly an island and not the beginning of a southern continent, while the phenomena described contradicted its inclusion in the Southern Hemisphere. On the other hand, the corroborative raw data acquired separately about the African continent would suggest that, from the beginning of the second century, its extension toward the south could have reached the limits of the Antarctic Circle... The southernmost known point in Africa was Marin de Tyr at 57° 24’ S if one set, as Ptolemy did, a degree of longitude at 500 furlongs. Even when this data was corrected for a whole series of shifts, Ptolemy did not manage to do better than to situate this point (Cape Rhapton, probably Cape Delgado) at 15° S, which was enough to destroy the classic vision of a northern insular ecumene separated by a torrid interprovincial zone from a symmetrical southern ecumene, inhabited by Antipods. As we have already stated, progress in knowledge imposed, in an ever more irrefutable fashion, a new vision of a world structured around two Mediterraneans. The Roman Empire, organised around the little Mediterranean, was ascribed a congruous portion. This new vision was incompatible not only with the truth as revealed by Homer, but also, and above all, with the vision of an ecumenical empire. It is precisely at the time when the facts imposed this new vision of the world, that cultured circles close to power massively rejected it to restore the image of an insular world, and that a genuine promotional campaign re-established this archaic representation. All discoveries were not acceptable. Ptolemy's world was massively rejected, first by the Empire, then by the Christians of the 6th century, not for theological reasons, but because Christian ecumenism

had been moulded by an imperial ecumenism that had reduced humankind to the population of the Empire...

Conclusion: Sea, empire awareness, life and death of maritime empires.

The sea and oceans made more numerous and frequent trips possible within a vast space than land. Whatever the navigational space concerned, navigation for the purpose of fishing, trade or war, or even exploration, usually developed along relatively common routes that allowed the navigator to glean only empirical knowledge of the areas he was used to travelling.

Unlike Han China, the Roman Empire, organised around the sea and endowed with maritime coastlines on two Oceans, made the sea one of the major agents of travel. Roman routes made it possible for news to travel within an acceptable timeframe whatever the conditions. But human travel was mostly done by sea, especially over great distances. This travel enabled the administrative and cultural integration of distant provinces, as well as the Empire's cohesion.

The *curricula vitae* of ranking Roman civil servants illustrates the astonishing geographical mobility of some agents of the state. One among them started his career in Syria in the second century, and pursued it on the Danube, then on to Alexandria. He then took a post in what is now the Maritime Alps region of France, before exercising his talents in Andalusia, then in Cappadocia, in Ephesus, and finally in Gaul. His subsequent posts took him to high offices in Rome, a prelude to government office in Egypt, in Alexandria... A century later, another civil servant started his career in Spain to continue it in Germanic lands (Germania). From there, he held office in Arabia, before briefly returning to Rome, from where he departed once again for Germania. His next post took him to the north-east of Asia Minor, after which he took another post in Ephesus before being called to Lyon. He finished his career at the Palace of Rome as a court prefect...

At a lesser social level, the missions carried out in the third century by a citizen of Ephesus to plead the cause of his city gives us an idea of the magnitude of travel, primarily maritime or sea/river, that the cities could impose on their members who were not ranking officials. This man is said to have gone to Rome several times, and to Brittany, but also to Germania, Nicomedia (Izmit), and all the way to Mesopotamia on behalf of his city. Another list of trips was started in order to defend the interests of the province. Unfortunately, that list was lost.

More than the famous Roman routes, maritime connectivity of the *Mare Nostrum* was undoubtedly the glue of the Roman Empire. On two occasions, both at sea, the birth of an imperial regime is witnessed, at Naulochus (36 B.C.), then at Actium (31 B.C.) Until 268 A.D., when the Goths entered the Mediterranean from the Black Sea 2,000 ships strong, and sowed desolation in all of the Aegean Sea basin, the seas bordering the Empire had been seen relatively contained piracy, and civil wars with very little impact in time and space. No land invasion was ever as massive. By all accounts, this period of peace was exceptional in maritime history: the number of shipwrecks in the Mediterranean for the two centuries of the Empire is incongruous to everything seen in more recent periods. Roman peace, which explains not only the coastal propensity of cities, but also the development of maritime holidays and sea travel for pleasure, was an exceptional era in every way. The Empire faded in stride with the decline of its maritime routes, slowly but surely. The challengers of established authority tried in vain to regain control of the sea. In the West, Vandals destroyed the infrastructure they could no longer control.

As original as it was, this era only illustrates the dominant character of the sea in the shaping of empires. Many recent discoveries of shipwrecks are being made in the Indian subcontinent. It will take time before we know results of the breakdown of these shipwrecks by historical period. The fact remains that ancient shipwrecks from Antiquity and the Middle Ages are very widely documented.

This brief journey through the maritime history of Antiquity, inevitably more focused on the Old World than we might have liked, illustrates well the decisive role of the sea, and particularly a peaceful sea, in the dynamics of progress and travel. It is remarkable that, even on seas overrun with pirates who were the norm rather than the exception from the Mediterranean to Southeast Asia, piracy was inseparable from the expansion of maritime trade in general, and from the emergence of bonding ports in particular. There are no pirates in an economic desert... From the third millennium onward, control of the sea and its inland waterway extensions were fundamental elements in the emergence of developing and developed societies. The sea was the vector of development and of cultural inter-mingling that made the evolution of societies possible, even at the cost of the fall of maritime empires that were, every one of them, idols with feet of clay... Nonetheless, maritime persistence ultimately won out, provided we take a longer view: for the Chinese, Ta-Tsi remained Ta-Tsi before and after the emergence of the caliphate in the 7th century. The country of Ta-Tsi was characterised by milestones, including the wearing of turbans, but the trade flow remained unchanged. In the Mediterranean region, the Arab conquest did not end the flow between

Africa and the north of the eastern basin. Since the dawn of history, the infinite power of maritime resilience has been an extremely striking trait. Indifferent to the collapse of powers that organised, enhanced or reduced distribution, maritime power never made the sea into the desert it could have been. A quasi-ritual question is asked of foreigners who land by sea in Homer's Odyssey: "Stranger, who are you? From where do you hail along the routes of the sea? Do you come for trade, or are you wandering in search of adventure like bandits, risking life and limb, harbingers of evil to other people?" The sea is still a two-faced being of which the pirate and the merchant are two unavoidable and complementary figures. Repulsive but remunerative, the sea banishes and reunites in rhythm with the seasons and dangers created by man. Even in times as distant as Antiquity, never was it the insurmountable chasm that scholars have long considered it. Rather, the current re-evaluation of maritime activity in Antiquity, from the Mediterranean Sea to the China Sea, makes the sea the driving force in the development of ancient societies.

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