

Chapter I

THE WORLD WITHOUT THE PACIFIC

I will confute those blind Geographers
That make a triple region in the world,
Excluding Regions which I meane to trace . . .

. . . the trade of Asia is the foundation of commerce . . .

Before Magellan

Strictly speaking, there was no such thing as ‘the Pacific’ until in 1520–1 Fernao de Magalhães, better known as Magellan, traversed the huge expanse of waters, which then received its name.¹ Eight years earlier, in a moment which in the saga of the New World ranks only second to the landfall of Columbus, Balboa had seen—not the Pacific. He had seen the Mar del Sur, the South Sea—and so it remained, in common speech and very generally in maps and academic discourse, for over two centuries—until in fact the fur-traders following Cook, and after them the whalers, brought European shipping north of the Equator, into seas until then scarcely traversed except by the annual Galleons between Manila and Acapulco. What sea it was Balboa did not really know, though presumably beyond it lay the true Indies and Cathay, and just to be sure he claimed, with vast panache and formality,

real and corporeal and actual possession of these seas and lands and coasts and ports and islands of the south, and all their annexures and kingdoms and provinces to them pertaining . . . in the name of the Kings of Castile present or to come, whose is that empire and lordship over those Indies, islands and Tierra Firme northern and austral . . . whether within or without the tropics of Cancer and Capricorn . . . both now and in all times, as long as the world endures until the final day of judgement of mortal man.²

A comprehensive assertion, leaving no gaps: but still the South Sea, the claims of Their Catholic Majesties notwithstanding, was the greatest blank on the European map of the world; and by 1513 no other people had a world-map remotely comparable in scope and accuracy with that already acquired by Europe in the mere century since Prince Henry had sent the first of the Portuguese caravels creeping out to the Azores and down the desert coast of Africa. It had not always, nor long, been so; before 1421, the probable date of the first Henrician voyage, there can be no question but that Chinese and Arabs taken together, or

Christopher Marlowe, *The First Part of Tamburlaine the Great*,
1590, IV.iv; Meredith Townsend, *Asia and Europe*, London 1901, ix.

even separately, had a far wider knowledge of the world than had Europeans.³ The far side of the globe was only a vast void—though, significantly, it *could* be thought of as merely a narrow gap—across which Magellan carried a thin line marked with three island-dots, establishing also its vastness; a track almost lost in a waste of mystery and darkness. The major theme of this book will be the essentially European and American achievement of turning this emptiness into a nexus of economic and military power.

And yet, and of course, Europeans were not in truth the first discoverers. It is in one sense loose thinking to use ‘discovery’ as meaning simply the first sighting or exploration, whether by Europeans or others, that we know of: since few even of the remotest islands of the Pacific (the Atlantic is different) were uninhabited when Europeans came upon them, there were discoveries of which we know nothing, except that they happened. However, in a more limited context it is not rationalising too much to take ‘discovery’ in another sense, requiring the placing on written or graphical record, available (at least potentially) to seamen, merchants, and scholars all round the world, of the existence and position of the newly found lands and seas; and for the Pacific this placing of facts on enduring record was basically a European achievement.⁴ Yet the drama of exploration and exploitation was played out upon an already peopled stage; and the priorities of Pacific exploration are intra-European relativities, not absolutes.

To Europeans in the brief interval between Columbus and Magellan (and setting aside Columbus’s own confusion between his own ‘Indies’ and Cathay), where is now the Pacific was only a nameless naked space between the known to the west and the known to the east; simply the convexity of the globe, of greater or less extent according as one followed more modern (really more ancient!) or Ptolemaic estimates of the figure of the earth. But for those who lived on its continental shores there was an objective entity: here, a mysterious and limitless expanse of strangely salt water, a barrier; there, an avenue for active but littoral or thalassic, not oceanic, trade. And for those who lived on the islands ‘lost over its blue expanse like a handful of confetti floating on a lake’,⁵ the ocean was, if not a highway, then at least a net of local ways with a few widely-known nodes within an extensive but closed system. Clearly, it cannot always have been closed on all sides, at least not to one-way and perhaps one-time passage: the Islanders must have come from somewhere, though the whence and the how are still matters of sometimes hot dispute.

From the Equator to middle latitudes the Asian margins of the Ocean were the seats of great and ancient civilisations, with continuous polities long antedating the European polity painfully built up from the ruins of the Roman imperium. Tens of thousands of years before the Vikings and Columbus, men had filtered round the eastern shores, from Alaska to Tierra del Fuego, and there too, on the plateaus of Mexico and Peru, they had built up great cities and highly organised

empires; those of Peru had some maritime capacity. From either side forays into the unknown Ocean may well have been made. Because of the set of winds and currents, these are more likely to have been from the eastern shores except in the north, where in the belt of the west-east Kuro Siwo current and the Westerly winds there are many historic records of involuntary crossings by castaways from Japan.⁶ It is becoming clear that it is not so much a matter of whether men made some sort of Pacific crossing, but rather we must ask to what extent they did so, and whether contacts were on a scale sufficient to leave significant and lasting cultural effects. Some metallurgical techniques in the New World, for example, seem specific enough to suggest direct Chinese or Southeast Asian origins.⁷ But it is very difficult to envisage return voyages, and whatever such links as may once have existed, by the time of European contact their memory had been lost 'in the dark backward and abysm of time.'

Farther south, the peopling of the Oceanic Islands was the last major migration of mankind into a previously unpeopled realm: so far our earliest radiocarbon date is only some 3000 years ago. Even so, it is salutary to reflect that, by whatever combination of purpose and accident it took place, 'this incredible maritime venture was under way when sailors in Europe and Asia were barely ever leaving sight of land.'⁸ The achievement of those who so early ventured on the oceanic, as distinct from the marginal, Pacific—'over those never-navigated seas'⁹—is indisputable; not so the highly controversial problems involved in its understanding.

South again, the great island of New Guinea paradoxically enough was visited, not merely sighted, by Jorge de Menezes within thirty years of Vasco da Gama's landfall at Calicut, and yet deserves the name given it by its historian Gavan Souter in the title of his book: *The Last Unknown*. Not until 1933, and after preliminary aerial reconnaissance, did white men cross the jungle-clad and savagely eroded flanks of its central mountain core to find on its savannah plateaus vigorous and still entirely Stone Age peoples,¹⁰ though we now know of the existence of man in New Guinea 25,000 years ago, and of an advanced horticultural economy three millennia before our time.

And finally Australia, 'the last of lands', geomorphologically the oldest of the continents (taken as a whole, and perhaps barring Antarctica), yet to many of its earlier European settlers a mere afterthought of the Creator.¹¹ Here again the work of the last few years has revolutionised our concepts of the antiquity of man in the Pacific region. It is now beyond doubt that man was firmly established in Australia between 25,000 and 30,000 years ago; in Tasmania, isolated by the rising postglacial sea, 'a tiny universe of 4,000 hunters survived as direct inheritors' of Palaeolithic culture 'until they were destroyed in one generation by civilised man early last century.'¹² Both antiquity and failure to survive are in marked contrast to the position in the Islands.

Such, in baldest outline, is a sketch of the Pacific side of our globe as it was before

Magellan. When he sailed, the best-informed European would have known the outlines of most of the Atlantic shores, and have had some knowledge—incomplete and inaccurate—of the East Indies, together with a tiny glimpse across the Isthmus of Panama and some distorted pictures, vague yet highly coloured, of China. The first reports of Yucatan had reached Spain, but there was as yet little firm knowledge of what was to become Nueva España. All the rest was beyond European ken, and the North Pacific and the east coast of Australia remained so for another two, or two and a half, centuries; and these centuries added little to knowledge of the Islands except some exceedingly spotty reports.

In the remoter phases of the long story of human endeavour in the countries around the Pacific there are still many gaps, many mysteries; and to some of these problems, in Oceania, we may return. But the scope of this book as a whole is temporally more limited, essentially to the Euro-American phase, which, be it remembered, even for the Pacific Islands, the most recently peopled division of the globe, is little if any more than a tenth of their total time-span. For a fair proportion of its sectors, this phase of the Euro-American expansion suffers rather from an embarrassment than a paucity of documentation. The ostensible starting point looks clear cut: Magellan's voyage of 1520–1. Even so, for its antecedents we must go back as far as classical antiquity, and specifically to Ptolemy the Geographer, writing about A.D. 150–60, and to Eratosthenes in the third century B.C.

The shrunken Globe and the opened Sea

Neither the intent nor the achievement of Magellan's voyage was to demonstrate that the earth was a globe; that had been common knowledge, to the educated, for centuries. The picturesque names of Cosmas Indicopleustes, 'the Indian Traveller', and of his book *Christian Topography* (c. 540), are all too easily adaptable as light relief in elementary textbooks; so is his extraordinary model of the world, just like an old-fashioned trunk with rounded lid and inner tray corresponding to the Firmament. This engaging irrelevancy is perhaps in part responsible for the vulgar error that, until Columbus and Magellan, only a very few unorthodox persons did not believe in a flat earth; an error persisting to our own day.¹³ While Cosmas himself had very little influence, and 'the passionate declamations of a Lactantius or a Cosmas are only individual opinions' and did not commit the Church,¹⁴ it is also true that most of the early Fathers repudiated sphericity, with more or less conviction; but some, and those of the greatest, seem doubtful—Clement, Origen, Augustine—or, like St Ambrose and St Basil, simply regard the question as irrelevant to a Christian's beliefs.

But obscurantism was perhaps never total, and did not endure. Already the Venerable Bede (673–735) seems to have inclined to believe in a globe. While one cannot always be sure that a medieval writer who refers to a 'round' earth is thinking of a disc or a sphere, yet in general 'By the eighth century the Church appears to have largely forgotten its early doubts about the shape of the earth and

to have accepted the saner opinions of [most of] the Ancients',¹⁵ and seventy years ago Beazley wrote

It is almost unnecessary to repeat that the roundness of the earth, so clearly stated by Bacon and so finely illustrated by Dante, is everywhere assumed by the greater schoolmen (writing as geographers), from the thirteenth, and even from the twelfth, century.¹⁶

Unfortunately, although in the twelfth century William of Conches could return Cosmas's hysterical attacks on believers in the sphere by asserting that flat-earthers were 'bestial',¹⁷ it still seems necessary to repeat it.

In the Middle, as distinct from the 'Dark', Ages the real debate was on the question, theologically much more serious, of the Antipodes: whether there were lands on the other side of the globe, whether they were accessible, whether anyone could live there. Although, as is usual with the Holy Writ of any belief, texts could be taken in differing ways, there was nothing in Scripture incompatible with a spherical earth. 'The world also is stablished, that it cannot be moved', God 'hangeth the earth upon nothing'—both texts would fit neatly into the Ptolemaic scheme of spheres; and God 'sitteth upon the circle of the earth.' But—Adam was the father of all men, the Apostles were commanded 'Go ye into the world, and preach the gospel to every creature';¹⁸ and how could that be if, as had been generally held from antiquity,¹⁹ the Antipodean lands, if indeed they existed, were barred from the Oecumene, the known habitable world, by a zone so torrid that in it human life was impossible? And hence the Antichthones or Antipodeans themselves, if *they* existed, how could they be sons of Adam?

The struggle over the Antipodes was longer and sterner than that over the Globe; nevertheless by the twelfth century the concept of antipodal lands seems to have been very generally accepted; one powerful line of argument saw an Austral land-mass as necessary to preserve the balance of the globe. Some thought that such lands were habitable, a few that they were inhabited—perhaps (but this was indeed dangerous thinking) by an entirely different race of men, not of the seed of Adam. For one thing, the reports of Marco Polo and of the Arabs who had travelled far to the south in Africa seriously eroded the northern frontiers of the supposedly uninhabitable zone; for another, men of the weight and standing of Albertus Magnus and Roger Bacon argued the question acutely and came down firmly in favour of habitable lands beyond that zone.²⁰

No doubt for centuries the mass of the illiterate populace, if they thought at all about such things, were content to live out their laborious lives under the dome of heaven and on an undefined middle-earth; but global thinking was not confined to academic speculation and treatises in Latin. The travels of that genial impostor 'Sir John Mandeville', written about the 1350s, became the most popular science fiction of the Middle Ages, the top best-seller; but, like modern writers in the genre, Sir John had provided himself with an extensive if uncritical scientific background. Mandeville, whoever he was, gathered his materials from any and every available source, but these included solid works

such as the *De Sphaera* (c. 1220) of John of Holywood or Sacrobosco, a standard manual for at least 300 years. The chapter of the *Travels* on the evil customs of the Isle of Lamory (Sumatra) deals concisely with nudity, community of women, and cannibalism, and then plunges into a demonstration not only that ‘the earth and the sea be of round form and shape’ but also that there existed habitable, and inhabited, Antipodes:

And therefore I say sickerly [with certainty] that a man might go all the world about, both above and beneath, and come again to his own country . . . For ye wot well that those men who dwell even under the Pole Antarctic are foot against foot to those that dwell even under the Pole Arctic . . . For ilk a part of the earth and of the sea has his contrary of things that are even against him. . . .

And this was written in a book which became ‘a household word in eleven languages and for five centuries’, surviving in some 300 MSS.²¹

Nevertheless, dread, especially popular dread, of the torrid zone long persisted, and had to be reckoned with. To antiquity, the obstacles were searing heat, deserts, vast mountains, though on some versions of the world there was an equatorial sea. In the Middle Ages the seas themselves, beyond known limits, came to be considered evil, the home of unspeakable horror—

The very deep did rot: Oh Christ!
That ever this should be!
Yea, slimy things did crawl with legs
Upon the slimy sea.²²

Such terrors applied especially to the seas which were most relevant to any hope of a waterway to the Indies around Africa. The prime source for these tales of mystery and terrified imagination seems to be Arabic: from the tenth to the fourteenth centuries writers of the stature of Masudi, Idrisi, and Ibn Khaldun had spoken of the Western Ocean as a ‘Green Sea of Darkness’, viscous and yet storm-swept, shrouded in thick and perpetual gloom; and ships might be dragged down to the hideous deep by some many-tentacled monster, or even (perhaps) by the giant hand of Satan himself.²³ Practice rather than theory dispelled this myth; nevertheless for fifteen years, 1419–34, the bastion of Cape Bojador, the ‘bulger’, girt by treacherous shoals, reefs, and currents, marked a *ne plus ultra* to the Portuguese thrusts to the South.²⁴

Ptolemy is conventionally known as the Geographer, but this was not his role until very late in the Middle Ages: for most of these centuries he is the great cosmologist of the *Almagest*, with its complex system of epicycles to account for the movements of the heavenly bodies. His geographical work was known to the Arabs, but had singularly little impact in the Christian world.²⁵ But a Latin version of his *Geographia*, direct from the Greek, was made in Italy about 1406, and there are over forty MSS. still extant in one or the other language; the work was printed in 1475.²⁶ The special feature of Ptolemy’s work, excellent in theory,

was his introduction of a system of co-ordinates for some 8000 places throughout the then-known world; given the lack of instrumental techniques, the longitudes in particular could not be anything but exceedingly rough approximations, often grossly incorrect even in the Mediterranean. But they gave a spurious air of precision, and from them maps could be constructed, or reconstructed (Plate I).²⁷ These maps had a strong influence on geographical thinking in the fifteenth century, and, for the Spanish under Columban influence, even later.²⁸



Plate I. THE PTOLEMAIC WORLD MAP. For comment, see text, pp. 7–9. From the Nürnberg Chronicle, c. 1480. NLA.

By a most happy scientific error, perhaps the most fruitful in all history, Ptolemy rejected the remarkably good estimate for the circumference of the globe made by Eratosthenes nearly 400 years before him, and accepted a value about one-sixth too small.²⁹ He compounded this error by inflating the longitudinal extent of the Oecumene, from the Fortunate Isles (the Canaries) to the land of the Seres or China, making it no less than 180° , half the world's round, instead of a true distance of about 140° —and moreover he set no eastern limit to China, so that the land of Eurasia might stretch out eastwards indefinitely. He thus reduced the globe by about one-sixth and then stretched Eurasia, in the relevant latitudes, over one-half (or more) of this reduced extent, instead of two-fifths. Columbus, as we shall see, improved even upon this; he had other authorities, but without that of Ptolemy—as it were his minimal case—it is unlikely that he would have got the backing for his voyage.

The idea that Asia might be reached by sailing westwards from Europe has a long and respectable pedigree; indeed, the very first hint is in Eratosthenes himself.³⁰ But his work survived only in fragments quoted by other writers, and he had no influence in the Middle Ages, except that through Macrobius (c. 395–423) his value for the size of the globe was widely accepted; but Roger Bacon, for instance, followed Ptolemy in thinking that the distance between Spain and ‘the beginning of India’ was quite small.³¹ More important was the virtual rediscovery of the *Geographia* after 1406, in fact one of the most important episodes in intellectual history.

Pierre d’Ailly, Cardinal of Cambrai, had produced about 1410 the *Imago Mundi*, a careful conspectus of the academic geography of his time. By 1414 he had seen a Latin version of Ptolemy’s *Geographia* and hastened to exploit this new source in further geographical works, which formed an important part of Columbus’s documentation. Ptolemy had cited, though he did not accept, the view of his predecessor, Marinus of Tyre, that the extent of the habitable world was at least 225° of longitude; and again Marinus set no limit to the eastwards extension of Eurasia.³² Columbus seized upon this extension—nearly two-thirds instead of one-half—and by adjusting every variable or uncertainty to his own desires he managed to reckon the distance from the Canaries to Cipangu (Japan) as a trifle of 4445 km, well under a quarter of the true distance. Marinus brought China as far east as Hawaii; Columbus brought Japan to the Virgin Islands!³³

The total effect of the geographical speculations of the fifteenth century was, then, to envisage a globe much more manageable, in dimensions at least, than it was in reality.

Another aspect of the Ptolemaic scheme, however, was much less convenient. This was the view that the southern coasts of Asia curved round in a vast arc to join Africa, making of the Indian Ocean an enclosed sea. To accept this was indeed to make a retrograde step, but fortunately its significance was much greater in academic circles than in the world of affairs.

The geographical compilers of the later Middle Ages by and large ignored the first-hand travel reports which could have been available to them. Mandeville, a ‘popular writer’, of course raided everybody, but although there were exceptions (such as Bacon’s mention of William of Rubruck’s mission to the Great Khan), scholars usually preferred the endless rehashing of classical authority, mixed with material from the vast and confused compilations of the Dark Ages. By critical examination of conflicting classical views the greater writers did indeed attain to some originality, but this was more in the direction of cosmographical speculation—the Antipodes, the Oecumene—than in topographical geography. Marco Polo was not as universally derided or ignored as tradition suggests—the number of manuscripts, no fewer than 119, attests this. By the fifteenth century, however, he was being taken more seriously, especially perhaps his exaggerated view of the wealth of Cipangu, which he had not seen. His book was studied

not only by Columbus but by Prince Henry; a manuscript of it was presented to the latter's brother Dom Pedro by the Doge of Venice.³⁴ Nevertheless the general cast of academic geography was excessively bookish.

But alongside the clerisy, though outside business dealings not much in touch with it, was the merchantry. Ptolemy, as J. H. Parry remarks, was both stimulating and enslaving—

The exploring activity of the late fifteenth and early sixteenth centuries was dominated by a small group of men, regularly employed in difficult and dangerous tasks. They were not for the most part learned men. The fifteenth-century revival of ancient learning affected them only at second hand; that, no doubt, was one reason why they were not intimidated by Ptolemy.³⁵

But much earlier such men, perhaps less regularly commissioned, had pioneered new trade routes or reopened old ones: Polo himself is witness, and his successor Pegolotti, who advises the overland trader into central Asia to pick up a Crimean woman as cook and concubine: there is no obligation, but life will be easier that way.³⁶ 'Now it is this more humble kind of people whom we must consider as the principal mediators and teachers' between Islam and Christendom;³⁷ as well as concubines, such hard-headed and professionally observant characters undoubtedly picked up also a vast amount of firm geographical knowledge from their peers, of all races and creeds, in the ports and caravanserais from the Crimea to the Nile. This would have included the knowledge that the African coast ran south far beyond the remotest Ptolemaic cape.

The Arab cartographic tradition seems always to have shown Africa as encircled by sea on the south, and this tradition is carried on by the Sanuto world-map, between 1306 and 1321; but these are 'disc-maps', reminiscent of the 'T-O' type common in the earliest Middle Age, and of limited value as evidence of real knowledge. Really extraordinary is the Laurentian Portolano of 1351-70, as Beazley says 'among the confounding things of history'—*if we could accept it as all of a piece, which is impossible*. This shows an outline for the whole African continent which is astonishingly real, and yet no known or even legendary voyage—at any rate since the Phoenician one from east to west, reported by Herodotus—could have accounted for it; but most likely everything south of Cape Non, or at best Sierra Leone, is a later addition under Portuguese influence.³⁸ We may also recall the Vivaldi brothers, who sailed from Genoa in 1291 to seek the trade of the Indies by sea. They were probably not the first to venture down the Mauretanian coast, never to return.

By 1457-9 the Genoese World-Map and Fra Mauro show Africa as a peninsula, and the Indian Ocean as an open not an enclosed sea; and half a century before the Ptolemaic map was in print, Prince Henry's men were disregarding the Ptolemaic view of Africa as curving round to join India.³⁹ The complex claims to priority of Castilians, French, Genoese, Portuguese, and even (and perhaps) one English couple,⁴⁰ in the eastern Atlantic islands and on the opposite African

coasts do not concern us here. What is significant is the Portuguese drive down the west coast, beginning soon after the capture of Ceuta from the Moors in 1415 and, though occasionally interrupted by other political concerns, maintained with remarkable steadiness until complete success was achieved at the end of the century. This involved the acquisition of accurate knowledge of winds, currents, and sailing courses, especially the *voltas* or return routes, which were well off-shore: Vasco da Gama's great westwards sweep on his way to the Cape was perhaps less daring but better-prepared than is generally allowed. This drive of course was the great enterprise of the Infante Dom Henrique—the title of 'the Navigator' is a spurious piece of British romanticism. It is an exaggeration to institutionalise the group that Henry gathered round him into a formal 'Academy of Sagres'; but it was remarkable in that it included some of the best informed cosmographers and most practical seamen of the age; some of its scholars were Jews in close touch with the Arab tradition. Motives were doubtless highly mixed—the Crusade against the Moors, the geostrategic advantage of holding Moroccan fortresses, the propagation of the Faith, gold, slaves, adventure, fame, intellectual curiosity. 'Guinea gold', slaves, ivory, and the inferior 'malagueta' pepper of West Africa had long been available in Mediterranean ports from Muslim traders—at a price; and the desire to cut out these middlemen was certainly a factor. It would be difficult to say just when the trade, especially the spice trade, of the Indies became a dominant, but the Papal Bull *Pontifex Romanus* of January 1454 definitely speaks of Henry's intention to circumnavigate Africa, though in a context of struggle with the infidel rather than of trade. Nevertheless, while D. Henrique 'certainly was always imbued with religious fervour . . . after the earlier years of his career he was, above all, the administrator of an economic enterprise of national importance and international consequence.'⁴¹

Alfonso X, the Wise, King of Castile from 1252 to 1284, a notable patron and indeed practitioner of learning, sponsored the revision of the Ptolemaic astronomical tables, and is reputed to have exclaimed that if he had been consulted at the Creation, he would have planned a simpler and tidier Universe.⁴² It is perhaps fitting that the definite breach of Ptolemy's barrier between Europe and the Indies should have been made by Castile's rival Portugal just over a century after Aljubarrota, the 'Bannockburn' which broke the Castilian hold over the smaller kingdom. In 1488 Bartolomeu Dias sailed far beyond Cabo Tormentoso, his Cape of Storms, renamed by the King Dom João II the Cabo da Boa Esperança.⁴³ The way to the Indies lay open.

The European background

Europe was still under the shadow of the Black Death when Prince Henry launched the first modest voyages which were to lead, in almost exactly a hundred years, to the first girdling of the earth by men. That plague had carried off one-quarter, or more, of the population of western Europe;⁴⁴ and recovery from the

wrath of God, or the bite of the flea, was inhibited by the wars of men. Whatever factors lay behind the sudden, if thin-spread, European expansion far beyond the ends of their then-known earth, population pressure was not one of them.

The political *leit-motiv* of most of the fifteenth century in Europe, and of most of its individual countries, was disunity and internecine war; and this in face of the continuing advance of the Ottoman Turks, who even before the century opened held much of the Balkan peninsula, and during it took not only Constantinople but also the rest of the Balkans (up to and including Bosnia), Greece and the Ionian Islands, and even—briefly (1480–1)—Otranto in Italy itself. Not even this manifest menace could impose any but the most local and temporary alliances within Christendom; the years from 1402 until 1454, when ‘a concerted Italian effort’ might have saved Europe from the Turks, ‘were consumed by three of the wealthiest and most advanced communities in the world [Florence, Milan, Venice] in a contest which had no significance for civilization.’⁴⁵ Pius II died at Ancona waiting vainly for Venetian galleys to take him on his crusade, and the quick recovery of Otranto owed more to the unexpected death of Mohammad II than to the modest local league formed to regain it.⁴⁶

In the Holy Roman Empire, the burning of Jan Huss in 1415 was followed by twenty years of Hussite Wars; and the long reign of Frederick III (1440–93) was a time of internal weakness and constant encroachment by border powers—Burgundy, Poland, Bohemia, Hungary—only relieved, towards the end, by the marriage which brought most of the Burgundian territories to his son Maximilian, and paved the way to the unwieldy but giant domain of Charles V. In 1415, again, England, flushed with the delusive spirit of the Agincourt song, was fatally embarked on the losing game of the conquest of France; and when that dream was wrecked she plunged into her own thirty years’ war, which by a bitter irony has received the chivalric, almost idyllic, title of the Wars of the Roses. Long after the end of the Hundred Years’ War some of the finest provinces of France—Normandy, Gascony, the Ile de France itself—were still devastated, and some tracts had almost reverted to wilderness.⁴⁷ The recovery under Louis XI was slow and painful, impeded at first by the ambitions and arrogance of Charles the Bold of Burgundy; and the strength so carefully and unscrupulously built up by Louis was soon perverted by Charles VIII to the adventurism of the Italian wars. In Iberia, both Aragon and Castile were more than normally wracked by endemic dynastic and feudal conflicts until the Union of their Crowns in 1474. Only Portugal seems to have escaped internal war, but for a brief and slight affair in 1448–9. It is perhaps only as a chance result of dynastic accidents that the Crown of Castile was united with that of Aragon rather than of Portugal.

Nevertheless, beneath this surface agitated by the showy or bloody futilities of princes and dukes and bishops, there ran the continuities of commerce, expanding into new factors potent to shape a new world. The fall of Constantinople was very far from closing down trade with Asia—there was another Islamic power, that of the Mameluke Sultans, in Egypt until 1517—but despite some

‘shrinkage of the Mediterranean trade system’,⁴⁸ Venice and Genoa still sent their great ships to northern ports, and these fleets had a multiplier effect:

... a sudden rush of vital forces to the periphery of the European continent facing the Atlantic Ocean. An all-water route [between the Mediterranean and the North Sea] presupposed concentrations of manpower, investment capital, and sizable monetary exchanges; it presupposed also organization, the training of sailors, the establishment of ports of call on the very long route (at Seville and especially Lisbon) ... A division of responsibilities was necessary if such exchanges were to run smoothly and grow. A young and alert [merchant] capitalism favored these commercial relations.⁴⁹

The capitalism of the age may have been young, but it was already far from primitive, nor was it confined to commodity trading. While most manufacture was literally done by hand, the great textile industries of Flanders and Italy had long been in the hands of moneyed entrepreneurs who put out piece-work to artisans working in their homes, a form of organisation which, on the scale of the times, might be considered mass production. But a few industries demanded a more centralised plant: a great Venetian ship, for example, could be over 1000 tons and was a most complicated machine, and the state shipyards of Venice called for a large specialised labour force. New trades such as printing and gunfounding, the extension of mining to deeper levels, called for organisational as well as technological innovation.⁵⁰ The Fuggers began as simple cloth merchants and graduated to finance; the second Jacob Fugger (1459–1525) managed an economically virtuous circle of lending to the Habsburgs on the security of mining royalties, by which he secured the mines themselves and more money for more lending. ...⁵¹ Monopolies, corners and cartels were already incipient. As the bankers for Charles V’s wars, the Fuggers were the power behind the Imperial throne; almost, the first multinationals.

‘Of all the economies, [Europe’s] was the most imbued with monetary techniques utilizing both hard cash and other media of exchange’, and hence already in the fifteenth century Europe had ‘established herself at the center of a vast but weak world economy.’⁵² This early lead in money power certainly contributed not only to the organisation of the Discoveries in the specific sense of financial backing, but to the whole climate which impelled to them. All actions had their reflex; gold made more wars possible, more wars bred the need for more gold. The great work of the latter part of the century in England, France, and Spain was the reduction to order of a turbulent nobility. The cost of guns was a factor limiting the attractive prospects of war for private ends; the bigger the ruler, the better the credit for guns and men. Bankers and monarchs were natural allies.

From about 1435, then, we have in the west four relatively well-knit and increasingly ‘national’ states; and if England was as yet relatively weak and isolated, and France seduced into the Italian adventure, Portugal and Spain, poised on the very edge of the Westerly-Trade Wind circulation, of vital

importance to the development of ocean routes, were well placed to initiate the expansion.⁵³

We must however distinguish: Castile rather than Spain, for Aragon was still deeply involved in the western Mediterranean, and the Kingdom of the Two Sicilies was still under her Crown. Indeed, the American Conquista was almost exclusively a Castilian prerogative, and until 1596 this restriction had the force of (often breached) law.⁵⁴ Portugal, as we have seen, had enjoyed a full century of domestic peace after the national rising (1383–5) which had brought the bastard but able House of Aviz to the throne, a rising of the gentry and of the towns and the *arraia-miuda* or *menu people* rather than of the nobles, who feared to ‘affront so great a Lord as the King of Castile.’⁵⁵ Crown and people were thus well in accord, and the resulting dynamism—‘Bliss was it in that dawn . . .’—which still thrills through the pages of Fernão Lopes’s *Crónica de D. João I*, coupled with the very unusual team spirit of Prince Henry and his brothers, the grandsons of John of Gaunt, provided a very encouraging milieu for the grand design. And one reason for Portuguese priority on the real road to the Indies may be that suggested by Livermore: the discovery had to wait until the maritime technology was ready, but this once given,

Perhaps an even stronger obstacle was the simple habit of journeying east to get to the East. Only a nation which had not its gaze fixed on the conventional trade-routes of the Mediterranean could foresee that the nearest seaway to the East lay due south.⁵⁶

As the sequel will show, the Portuguese had taken the measure of Ptolemy to a much greater degree than had the Spaniards.

The lure of Asia

Always, since the Crusades, Europe had been conscious of Asia as a land of marvels and of wealth. Commercial relations between the Mediterranean world and the Orient were of very long standing, though subject to many vicissitudes and at times to almost complete breakdown. Roman publicists, notably the elder Pliny, deplored the drain of precious metals to the East in exchange for effete luxuries—silks, spices, perfumes—and in Graeco-Roman times there was an active maritime trade via the Red Sea to the littorals of the Arabian Sea. This is attested not only by the ‘manual for navigators and traders’⁵⁷ known as the *Periplus of the Erythrean Sea* but also by the discovery near Pondicherry of a depot for the return trade from the Mediterranean—to judge from the large numbers of amphorae, largely in wine.⁵⁸ Alexandria was the main entrepôt for sea trade, Antioch for the overland traffic, mainly in silks from China. Later, Byzantium monopolised a smaller trade, but while the smuggling of silkworm eggs in Justinian’s time reduced Europe’s dependence on Chinese silk, spices remained an Asian monopoly.

While the early expansion of Islam from Antioch to the Maghreb (Morocco) may not have had the catastrophic and catalytic results ascribed to it by Henri

Pirenne in *Mediaeval Cities*, there was undoubtedly a very marked decline in commercial contacts, more especially in the western Mediterranean. The consolidation of Muslim power had an ambivalent effect: on the one hand the Crusades brought the Franks of the West into direct contact with the Levant and increased the demand for oriental luxury goods; on the other, it effectively debarred the West from direct communication with lands eastwards from the narrow littoral of the Crusader kingdoms. Until the thirteenth century, European ideas of Asia beyond Euphrates were vague and distorted in the extreme, far below the level of knowledge in the Graeco-Roman world.

A new opening to the East came in the aftermath of the Mongol invasions; after their great reflux from the borders of the Holy Roman Empire to their ancestral steppes, the image of the Mongols in European eyes changed, in remarkably short order, from that of devilish blood-drinking monsters to one of civilised potential allies against the nearer threat of the Seljuk Turks. Between 1245 and 1253 four missions, diplomatic and evangelical, were sent to the Court of the Great Khan.⁵⁹ Not much success accrued to their primary aims: the heretical Nestorian Christians were well established in the East, and that mighty Christian potentate Prester John proved singularly elusive. But these emissaries, highly literate and conscientious reporters, brought back a good deal of useful information as well as agreeable fantasy, and Trade soon followed the Cross. After the Polos a whole new world was opened to the traders of Venice and Genoa, the latter working from their advanced bases in the Crimea. For about a century from 1250, the 'Mongol peace' of Kublai Khan and his successors maintained firm order over the vast area from the Volga to Cathay, and when Pegolotti wrote his handbook, about 1340, the long caravan routes were still safe 'by day or night', and probably a good deal safer than many a King's Highway in Europe. Later in the fourteenth century, however, the huge but insubstantial empire broke up, and Asia entered upon a period of turbulence symbolised by the daemonic figure of Timur Lenk, Tamburlaine the Great. But at their height Italy's trade relations stretched from Norway to China, though her role was essentially a middleman's; very little of the traffic east of the Levant was directly in Italian hands, despite the presence of Genoese merchants in India and China.

Silk and spices were the great staples of the trade, though of course there were other high-value low-bulk lines—luxuries such as gems, dyes, drugs, fine brocaded fabrics. Chinese and Persian silks had a higher reputation than those produced in Europe; the trade in these seems to have been mostly overland and largely in Genoese hands. Given the monotony of foodstuffs available in Europe, the necessity of preserving the flesh of animals slaughtered for want of winter feed, and the badness of the wine (which often needed doctoring to be drinkable), spices might well be considered a necessity of life for people above the bare subsistence level of the peasantry; pepper especially was needed in large quantities for the winter 'salting' of meat. Venice was the great mart for spices, bought mostly in Alexandria from Muslim merchants. But in the fifteenth

century these great trades were increasingly shackled by political obstacles; not only disruptions of stability on the overland routes, but obstruction at the Levantine and Byzantine outlets into the Mediterranean.

Instability in Asia; the rise of a new Turkish power under the Osmanlis, tougher and more efficient than their Seljuk predecessors; the devastating incursions of Tamburlaine—all these imposed severe economic strains on the older states of southwest Asia such as Persia and Egypt. Twenty-five years before the fall of Constantinople, the Soldan of Egypt 'nationalised' pepper exports, raising the Alexandria price by over 60 per cent; a Venetian attempt at a boycott in 1480 failed before threats of violence.⁶⁰ Byzantium had been for so long islanded by Ottoman power that its fall in 1453 merely set the seal on a virtually accomplished fact; despite the long warning, the psychological shock to Christendom was great, but not great enough to impose a decent unity. Economically, it meant the end of the special commercial privileges held at Byzantium by Venetians and Genoese, and for the latter (compromised by their gallant part in the last days of the Christian city) the loss of their Black Sea colonies: Caffa, the modern Feodosiya, fell to the Turks in 1475. Moreover, before the marked rise in European silver production which began about 1450, output of precious metals in Europe was declining,⁶¹ while clearly both Egypt and Turkey were screwing up the terms of trade. Venice was thus in the paradoxical position of holding a monopoly squeezed at both ends, by ruthless price maximising by the suppliers and by an inelastic purchasing power of the customers. Yet by this time Asian luxuries were necessities to Europe—necessary at least to the expected standard of living of her ruling classes.

The room for manoeuvre within the established trading system was thus narrow, and to all appearance narrowing; the room for manoeuvre by outflanking the established routes was limitless, or at least limited only by ignorance and fear of the unknown. For by now western Europe had the technological and organisational capacities to break out of the circle, and an increasing need to do so. The tools were to hand, and it needed only courage and imagination to accomplish this truly revolutionary task.

Renaissance ships and navigation

Shipbuilding underwent a virtual revolution in the fifteenth century, although the vital adoption of the stern rudder was at least two centuries earlier. This revolution sprang from a very fruitful interaction between the traditions of the Mediterranean and the northern seas. Iberian builders, particularly those of Biscay, played an important role in this development, without which the Discoveries would not have been possible.⁶²

Mediterranean oared craft ranged from light fighting galleys to the great Venetians which sailed to Southampton and Bruges: three-masted and lateen-rigged, using their banks of oars in calms and for entering and leaving port, they were not only the largest but also the most dependable ships of their day—

at any rate outside the China Seas!—and hence favoured for passengers and valuable cargoes. Minor cargo in the coastal trade was largely carried by small or medium-sized lateen-rigged craft, fast and readily manoeuvrable, especially in light airs. Keels were curved, and hence a vessel could not be simply beached or allowed to settle aground on the ebb, but had to be shored up; this was not so serious a handicap in the almost tideless Mediterranean as in the Atlantic, though it made careening difficult. A major limitation to the usefulness of both oared and lateen-rigged craft, on long voyages, was their demand for large crews, with consequent reduction in pay-load. On the other hand, the Mediterranean carvel-built construction, with planking edge to edge and bolted or pegged to stout ribs, was superior to the over-lapping clinker-built sides of the northern ships, and in the sixteenth century clinker building was abandoned except for small coastal craft and sometimes for upper works.

The standard northern merchantman was the cog, roomier than equivalent Mediterranean vessels, better fitted to rough seas, and, with its straight keel, able to ground on the ebb without damage. In the fourteenth century the cog had usually only one mast carrying a single large square sail, but improvements in rigging and the handling of sails were continuous. Square-rig called for fewer seamen on large ships—for a vessel of 250 tons, say twenty men, as against fifty for lateen. Hence for bulk traffic where speed was not a primary factor, such as the very important alum trade, square-rig became generally adopted in the Mediterranean except for small coasting and fishing craft, and its advantages over lateen in the heavier weather of the open Atlantic were soon recognised: square sails were much easier to handle and to furl in strong winds than lateen on their very long yards. But the North in turn soon realised the advantage of having more than one mast: either a foremast or a lateen mizzen greatly increased manoeuvrability. Thus from about 1430 a bewildering variety of hybrids were developed, initially it seems largely by the Basques; the technical differences are of intense interest to the *cognoscenti*.⁶³ The end result, the standard big ship for most of the sixteenth century, was the carrack: three masts, with a lateen mizzen, high castles (especially aft), and a large central cargo hatch. This was the *nao* of the Spanish *Carrera* and the *nau* of the Portuguese *Carreira* to the West and East Indies respectively. By the 1590s such ships sometimes exceeded 1500 tons, though 700 to 1000 would be more usual; these figures had been exceeded by Chinese vessels two centuries earlier, and it is salutary to reflect that three of the essentials for oceanic navigation by *large* ships—the mariner's compass, multiple masting, the axial rudder—existed in China long before their adoption in Europe. Although their European initiation and development are probably independent, the remarkably rapid flowering of European ship design from about 1450 may owe something to borrowings from China via the Arabs of the Indian Ocean.⁶⁴

Early in the sixteenth century there was a rash of competitive prestige building of 'Ships Royal' such as the *Henry Grace à Dieu*, which might have four masts with three fighting tops on the main, and fantastic sail plans.

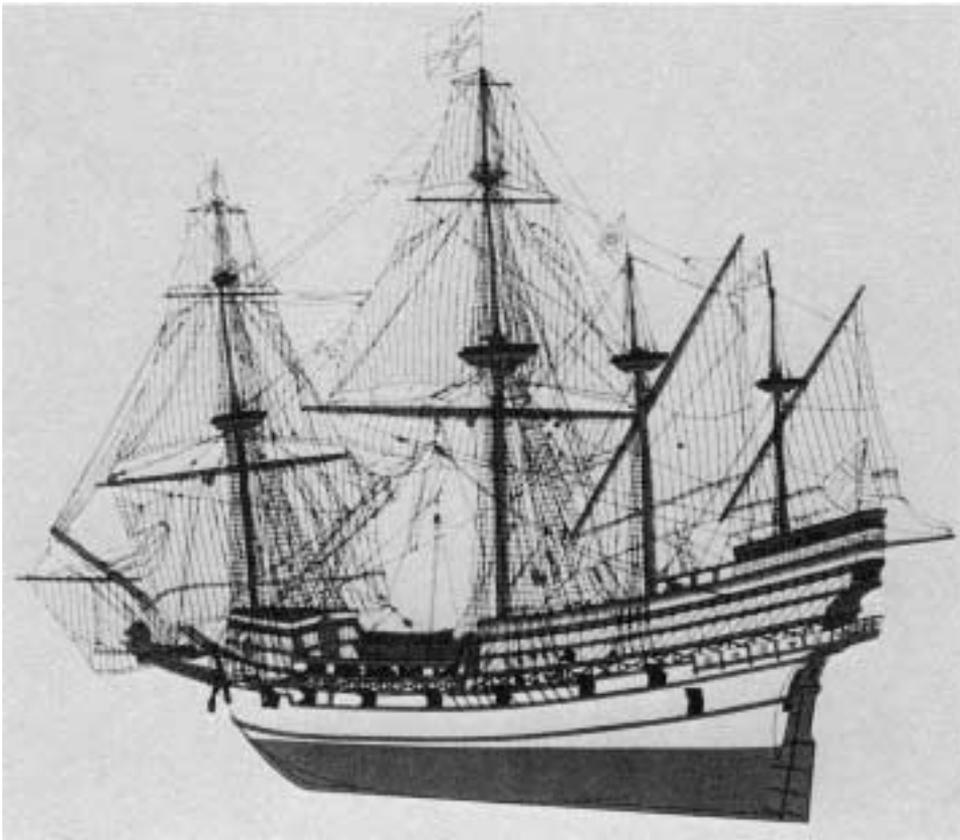
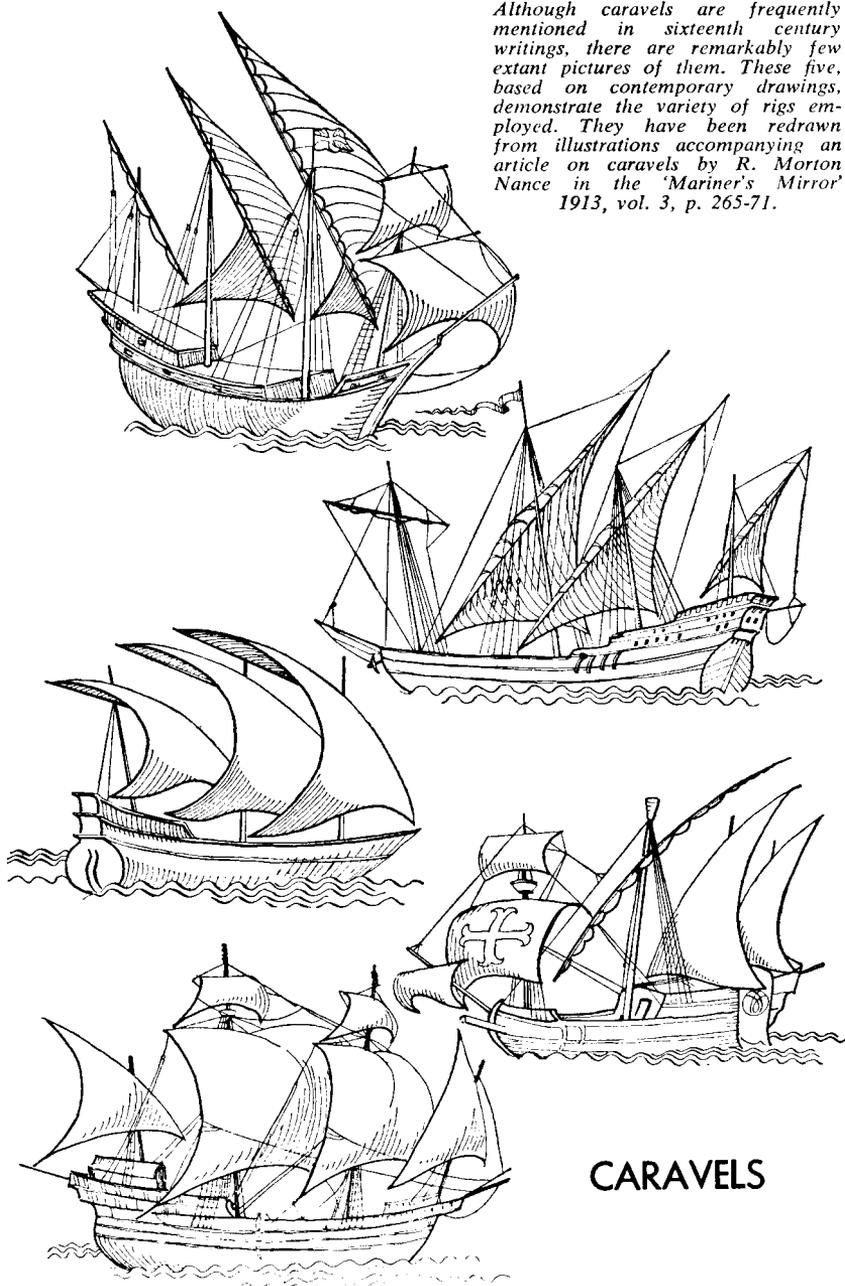


Plate II. AN ELIZABETHAN GALLEON. Reconstruction of a late sixteenth century warship of about 700 tons. From D. Macintyre and B. W. Bathe, *Man-of-War* (New York 1969), by courtesy of the publishers.

More to the point was the invention about 1501–2 of the gun-port, which meant that much heavier armament could be carried, guns to damage masts and hulls instead of light essentially anti-personnel weapons mounted on high ‘castles’ at bows and stern.⁶⁵ The future was not with the huge parade ships but with the galleon, developed as a specialised fighting ship, with lower castles (especially the forecastle) and finer lines than the carrack. Usually between 250 and 500 tons and carrying up to forty guns, some reached 800 or 1000 tons by the end of the century (Plate II).⁶⁶ Galleons formed the escorts of the Spanish trading fleets to America, carrying no licit cargo themselves except royal bullion, although the enormously important Manila-Acapulco run was worked by ‘the Galleon’. Another major evolution of the later sixteenth century was the development of more effective sail plans, including topsails on all masts except the mizzen, which long retained its lateen, and even topgallants.

THE LOST CARAVEL

Although caravels are frequently mentioned in sixteenth century writings, there are remarkably few extant pictures of them. These five, based on contemporary drawings, demonstrate the variety of rigs employed. They have been redrawn from illustrations accompanying an article on caravels by R. Morton Nance in the 'Mariner's Mirror' 1913, vol. 3, p. 265-71.



CARAVELS

Plate III. CARAVELS. From R. Langdon, *The Lost Caravel* (Sydney 1975), by courtesy of the author and Pacific Publications Pty Ltd. ANU.

Alongside these greater ships there was of course a host of smaller types, of which the most important was the caravel (Plate III), the main instrument of Portuguese exploration until the Cape had been rounded. The Portuguese caravel—the Spanish version differed—was apparently a home-grown product, developed from small coastal *barcas*. At first they were very small, under 50 tonéis, only partly decked, with two or three lateen masts; later they reached 150 to 250 tonéis or more, with three or four masts, the *caravela redonda* having one or two square sails on the foremast. Light and very handy, good at sailing near the wind, they were regarded as very versatile, as indeed they were; but, except for the largest, they had only a very modest superstructure on the poop and provided very little accommodation. Admirable for inshore work, they were not really tough enough for long-distance exploration in the open ocean; but as auxiliaries in war and trade, especially in littoral seas, they lasted until near the end of the seventeenth century.⁶⁷ In the north, the Dutch *fluyt* or flyboat became prominent as a medium-sized cargo vessel before 1600, and as the *felibote* played an important part in the colonial trade of Spanish America (Plate IV).

Finally there was a large assortment of small craft: pinnaces, *pataches*, *barcos*, *bergantins*. This last type must be distinguished from the later brigantines, as is sufficiently shown by the fact that Cortes built thirteen of them in seven weeks

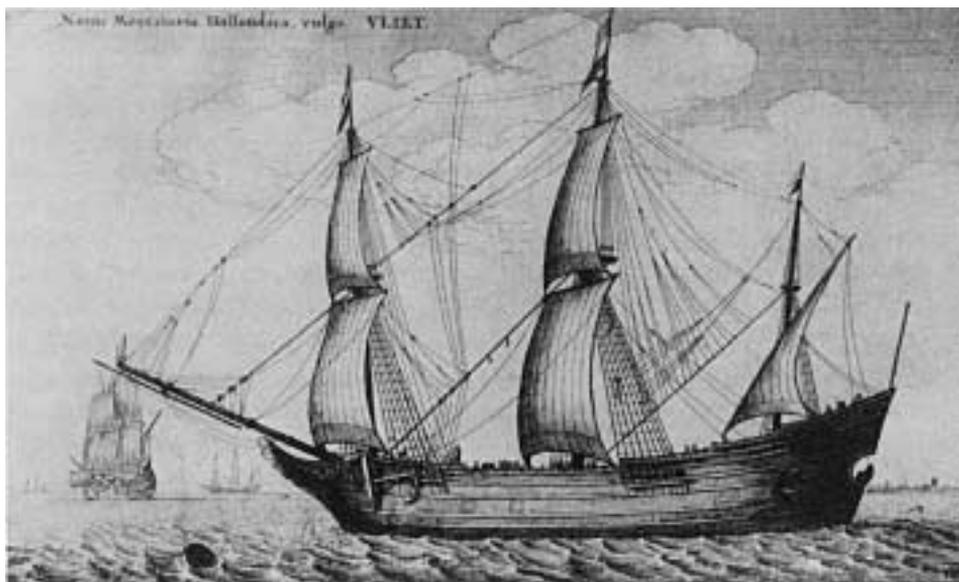


Plate IV. DUTCH FLUYTS. Roomy and cheap to build and work, the *fluyt* (English 'flyboat', French 'flûte', Spanish 'felibote') was much used as a general service cargo vessel from the later sixteenth century onwards. From R. Davis, *English Merchant Shipping and Anglo-Dutch Rivalry in the Seventeenth Century* (London 1975), by permission of the National Maritime Museum, London. ANU.

for his final attack across the Lake of Mexico.⁶⁸ The original bergantin seems to have been essentially a light galley with an auxiliary lateen (later square) sail, suitable for river or inshore coastal work, the oars making it possible to work against wind or current. Later the term recurs constantly in the records of the Spanish American coastal trade, along with the *patache*, which was like a small brigantine in the modern sense. In this context also the Spanish *fregata*, until quite late in the eighteenth century, often meant not a fairly large warship but a small or medium-sized coastal trader or *felibote*, often built in American yards, for coasting in the first place but capable in emergency of making trans-Atlantic passages.⁶⁹ The maid-of-all-work on English voyages was the pinnace, the counterpart of the bergantin.

It is a far cry from the galley and the cog to the great and complex ships of the seventeenth and eighteenth centuries, with broadside armaments which, unless in extraordinary circumstances, rendered them virtually impregnable to any opponents to be met with in extra-European waters. The continual increase in the size of long-distance ships had a sound economic basis, once coastal or littoral exploration had yielded to exploitation. For initial voyages over long distances out of sight of land, with no known ports of supply and little possibility of estimating the length of the voyage with much accuracy, safety demanded ample provisioning, with consequent loss of cargo space, though economy might dictate the use of smaller vessels, in twos or threes to spread the risk of loss.

To equip a ship of 65 tons for two years' exploring practically ruled out any pay-load, at least on the outward journey, though commodities as valuable for their bulk as bullion or spices could be brought back. But once commerce was established, a ship of 700 tons was much more economic than one of 300; the larger ship, with a crew of eighty or ninety, would demand a 'poids moteur'—food, stores, wine, water—of only 10 per cent of its transport capacity; the fifty or sixty men on the smaller would need 13 to 15 per cent. Hence the tendency to ever-increasing size in the *Carreira da India* (and to a lesser degree on the *Carrera*) and in the great *Indiamen* of the seventeenth and eighteenth centuries.⁷⁰ One possible limitation on this growth, the need to make up full cargoes, could be met by feeders to a few great ports, the 'country trade' of South and Southeast Asia in East India Company days, the *cabotaje* of the Caribbean and the Pacific in the days of the Puerto Bello fairs. For such miscellaneous carriage, as distinct from the great main lines, *fluyts*, later on brigs and barques, were essential. The real limitation in size was simply the cost and time of building the giants.

Navigation at the end of the fourteenth century, at least outside the Mediterranean, was still almost entirely a matter of empirical experience, with the simplest instrumentation: little beyond the compass and the lead, greased to bring up samples of the sea-bottom; pilotage rather than true navigation. The range of expertise of the ordinary skipper was still that of Chaucer's Shipman, relying

on an intensely detailed memory of tides and currents, ports and landmarks, essentially rule of thumb; although could he read, written pilot-books or rutters were probably already available. But the next century saw the gradual, and very uneven, introduction of theory. In the long run this was to change a craft 'mystery' into an applied science; already in the early sixteenth century the Casa de Contratacion in Seville had charge of a formal system of examinations for certifying Spanish pilots, who by this time had to acquire some mathematical skills.⁷¹

The date at which astronomical navigation was introduced is uncertain, although there can be no doubt that the necessities of their Atlantic voyaging made the Portuguese the pioneers: mere dead reckoning, even assisted by the traverse table, was no longer adequate, as it was in the Mediterranean. The first references to the observation of the altitude of the Pole Star are those by Cadamosto, who was on two voyages with the Portuguese in the 1450s; his terms—'the height of a lance' or of a man—do not imply instrumental navigation, but Portuguese students find it difficult to envisage regular two-way voyages between Lisbon and the Azores (officially colonised in 1439) without some techniques for taking heights of the Pole Star.⁷² Be that as it may, before 1480 the astrolabe and the quadrant had been adapted for use at sea (possibly by Prince Henry's Jewish expert, Master Jacome of Majorca), and tables of latitude had been drawn up for points as far south as the Equator—using the sun, for the Pole Star was too low to be easily observed as far south as Guinea. These tables are found in 'the oldest surviving navigational manual', the *Regimento do Astrolabio e do Quadrante*, of which an edition, probably not the first, was printed in Lisbon in 1509.⁷³ Later the Jacob's Staff and the back-staff (which avoided direct sights at the sun) superseded the cumbersome astrolabe, until the introduction of improved quadrants by Davis in the seventeenth century and James Hadley in 1731.

So much for latitudes: those of the *Regimento* are often correct to within ten minutes, so this was no longer a serious problem. The accurate determination of longitude at sea, however, remained in practice impossible for two and a half centuries after Pope Alexander VI had made it 'a live issue' by decreeing a meridian as the demarcation line between Portuguese and Spanish hemispheres. The theory was there—Vespucci and the Dieppois Jean Rotz had attempted to use lunar distances before 1540, Columbus tried the timing of a lunar eclipse, and Rotz and others thought that magnetic variation was or might be sufficiently regular in its distribution to give an indication of longitude.⁷⁴ But neither the observational nor the timekeeping instruments available were adequate to attain the precise readings which were needed. In effect, the mariner had to fall back on course steered and distance made. Distance was checked, all too roughly, by various log devices, all crude—though once again theory, with the concept of a geared instrument, was ahead of practicability. As for course steered, the traverse board, on which the time run on each bearing during a given period could be recorded, was an ingenious, if rough and ready, graphical solution. With

all these devices, latitude sailing—going north or south until one reached the latitude of the destination, then easting or westing—became a practicable and much-used procedure; to be safe from piling up on shore, one usually adopted the biggest possible estimate of longitudinal distance made.⁷⁵ But longitudes still remained a matter of dead reckoning, and the results can be seen in the vagabond habit of Mendaña's Islas de Salomon, discovered in 1568 and in the next two centuries placed anywhere between the longitudes of Cooktown in Queensland, 145°E, and the Marquesas, 140°W—a difference of 75 degrees! Those seen by Mendaña actually lie around 160°E.⁷⁶

Mediterranean sailors had long had the assistance of the portulan chart, which, especially in its fully developed Catalan form, gave an accurate delineation of the shores of the Mediterranean, and of the Atlantic as far north as the Narrow Seas; it had a linear scale and a system of wind-roses from which a pilot could work out his bearing from port to port.⁷⁷ It had no grid of latitude and longitude, and hence no projection; the earth was treated as a plane surface. For the Mediterranean, with its short north-south span, this did not greatly matter, since the convergence of the meridians over some 15 degrees of middle latitudes was too slight to induce really serious distortion. It was otherwise when the range of latitude involved stretched to the Equator and beyond, still more when the globe itself had to be plotted on a flat sheet.

This problem was not, of course, anything new, but it had hitherto been an academic one; the theory was well within the grasp of Renaissance mathematicians. It was once more the necessities of Portuguese navigation in the Atlantic which led to the first steps, again seemingly at the hands of the learned Master Jacome. Initially, these steps were modest enough, merely the addition to portulan-type charts of a north-south line marked off in degrees of latitude, originally just a line on magnetic north, later allowing for the variation by a similarly divided true meridian at the appropriate acute angle. Tables of the length of a degree of longitude according to latitude were produced, and early in the sixteenth century the Portuguese Jew Pedro Nuñez devised a quadrant by which these values could be read off directly. He also worked out the true spiral form of rhumb-lines—lines to intersect all meridians at a constant angle—but this was well above the heads of practical seamen, who needed a simple chart on which such a course of constant bearing could be plotted as a straight line. He was unable to provide this, but he led the way to Mercator—or perhaps more correctly Edward Wright—who did.⁷⁸ Nuñez anticipated Jonathan Swift in a fine, but more scientific, scorn for cartographers who used plenty of gold paint and planted all over the place flags, camels, and 'elephants for want of towns.'

The European moment

Western Europe in the year of Agincourt and Ceuta, 1415, was as yet only reaching out to Madeira and the Azores, though the Canaries, closer to the

African coast, had been known for over half a century. By 1485 the second great Portuguese thrust under João II was under way, and Columbus had just proffered to that king his alternative westwards course to the Orient. In seventy years Iberia, building on the experience of voyagings from the Azores to the Bight of Benin, had become technologically equipped for the vaster achievement of girdling the globe. But the use of this technology for so unprecedented an enterprise not only called for organisational capacity, but depended also on a particular ideological or moral climate.

An adequate technology, and powers of organisation, were indeed available to other peoples: to the Arabs, whose shipping and navigation were certainly not inferior to those of Europeans and whose commerce extended from Sofala in Mozambique to Canton and beyond; to the Chinese themselves. Indeed, in the very month of the taking of Ceuta, the fourth expedition of Cheng Ho returned to China from the east coast of Africa. This was through seas long navigated, from known port to known port; but his fleets were numbered in tens or even scores of ships and thousands of men; some of the ships themselves, and their numbers, were certainly much larger than those of any armada of the King of Portugal, then or for three centuries thereafter. The objectives were part commercial and part diplomatic, showing the flag on a giant scale, demanding tribute. But there was no follow-up; after the seventh expedition in 1431–3 such activity abruptly stopped, perhaps because of Mongol pressures on the northern frontiers of the Ming Empire.⁷⁹

But Europe needed Asia far more than Asia needed Europe. Islam was ‘the unavoidable intermediary’, seemingly securely entrenched with no compelling motive to attempt improving on a most profitable middleman’s position; and China, despite the dramatic excursions under the Ming dynasty, returned into her basically self-sufficing self. Myron Gilmore suggests that one factor, and a main factor, in the European seizure of the initiative was that ‘the attitude of the European world’ to those beyond its horizons was never ‘completely closed and assured’; and the openness of European society allowed for a fruitful co-operation of individual and state enterprise. It seems at all events that the great intellectual—and emotional—opening of the Renaissance coincided in time with a phase of relative stasis, if not of decline, in the Arab world, which had lost some of the outgoing energy of its earlier centuries, and with one of retreat to the home base in the Chinese.⁸⁰

The mental ardours of the age of Humanism, its desires ‘Still climbing after knowledge infinite, And alwaies mooving as the restles Spheares’,⁸¹ must surely have played their part. But neither intellectual curiosity nor fervour to spread the Faith would have been likely to secure the necessary backing without the *auri sacra fames*, the cursed lust for gold which could compel the hearts of men not only to infamy but also to deeds of high courage. In an age when ‘the amassing of a hoard of bullion’ was among ‘the prime objects of statecraft’, any state able to do so was bound to further the discovery and exploitation of new sources

of wealth, whether in the precious metals themselves or in commodities which commanded high prices, such as pepper and the other spices.⁸² This demanded capital and organisation on a scale not available in Portugal and Castile, except for the preliminary exploring voyages, and then often with difficulty. For major exploitation, outside sources of capital increasingly became necessary: Genoese, Florentines, the great German houses such as the Fuggers and the Welsers, took their shares:

the first great moves in oceanic discovery were the work, for the most part, of adventurous Portuguese and Spaniards; but the development of discovery, the foundations of settlement, trade and empire, were paid for by capitalists whose bases were in the older commercial centres of the Mediterranean and south Germany.

To those centres, the profits mostly returned. International finance made the Reconnaissance the concern of all Europe.⁸³

Nor would it be realistic to think that non-material factors, except sometimes a desire for adventure or escape, had much weight for the rank and file who manned the ships. For the officer class, duty to one's Prince was initially probably as important a motive as any; later, fame and El Dorado were always around the next peninsula. A few young gentlemen joined up to see the world and share the glory—Pigafetta, sailing with Magellan, is an outstanding exemplar. But the ordinary seaman, who shipped glory with every wave, would doubtless 'have preferred a coat For keeping off the spray'.⁸⁴ For the most part, unless compelled, they seem simply to have signed on for the job, accepting risks philosophically: it was just an extension of an already tough, hard, life. These, the unknown crews, faced dirt, rough living, poor food, disease, danger, in conditions to which the only modern parallel would be life in a concentration camp.⁸⁵

Seventy years after Ceuta, the two options had been delineated: Columbus's way, west across the Atlantic; da Gama's, south around Africa. A century after Ceuta, both these great avenues of traffic and endeavour were well entered into a vigorous life, though it was already sure that Columbus had found not Cipangu and Cathay but a New World. Between the Old World and the New, between the furthest thin-drawn tentacles of European penetration east and west, lay the last and greatest unknown quantity, the as yet unchristened Pacific.