

angle of Europe. To find the sea-path to the "thesauris Arabum et divitis Indiae" was the object to which he devoted his life. He collected the information supplied by ancient geographers, unweariedly devoted himself to the study of navigation and cartography, and invited, with princely liberality of reward, the co-operation of the boldest and most skilful navigators of every country. The prince's motto was "Talent de bien faire,"—the word "talent," in those days, conveying not the idea of power or faculty, but of desire. Having acquired military renown by the capture of Ceuta in 1415, he set his mind upon the conquest of Guinea, and sent every year two or three vessels to examine the coasts beyond Cape Nun, which was then the limit of exploration. Yet none of his ships for many years had the hardihood to round Cape Bojador.

The first fruit of Prince Henry's explorations was the rediscovery of Madeira and Porto Santo, in 1418 and 1420. The truth of the romantic story of the first discovery of Madeira by two English lovers named Robert Machim and Anna d'Arfet, in the time of Edward III., has been demonstrated by Mr Major. Madeira and Porto Santo were granted to Prince Henry by his brother, King Duarte, in 1433. In the same year one of the prince's ships, commanded by Gil Eannes, at length doubled Cape Bojador. In 1435 Affonso Gonsalves Baldaya, the prince's cup-bearer, passed 50 leagues beyond the cape; and eight years afterwards Nuño Tristam got to a point 25 miles beyond Cape Blanco. But it was not until 1445 that the mouth of the Senegal was reached by Diniz Dias; and in those days the Portuguese gave the name of Guinea to the country commencing at Cape Nun. In 1481 the king of Portugal assumed the title of lord of Guinea. Up to 1446 there had been 51 caravels to the Guinea coast, and almost every year some new advance was made. Meanwhile the Canaries and Azores were brought within the realms of Spain and Portugal. In 1402 a Norman named Jean de Bethencourt, accompanied by Gadifer de la Salle, had landed on the island of Lanzarote, and with reinforcements from Spain he subjugated Forteventura and Ferro, and received the sovereignty of the Canaries from the king of Castile. But he returned to his lands in Normandy in 1406, and died there in 1425. Gomera, Palma, Teneriffe, and the Great Canary were still unconquered. Prince Henry made several attempts to establish Portuguese rule on these islands; the right was long disputed with Spain; and it was not until 1479 that the treaty of Alcaçora provided for the concession of the sovereignty of the Canaries to Spain. Prince Henry, however, successfully colonized the Azores, and in 1444 St Michael's was discovered, the settlement of the other islands following soon afterwards.

In 1455 an important expedition was despatched by Prince Henry, under the command of a young Venetian adventurer named Alvise Cadamosto. Touching at Madeira and the Canaries, Cadamosto made his way to Cape Blanco on the African coast, and thence to Senegal and the Gambia. He returned with a full report of all he had seen, and in the following year he again sailed from Lagos direct for Cape Blanco, with three ships, and discovered the mouth of a river which he named the Rio Grande (Jeba?). In 1457 Diogo Gomez sailed with orders to proceed as far as he could, and made his way to the Gambia. The Cape Verd Islands were discovered and colonized about 1462.

Prince Henry the Navigator died on the 13th of November 1460, and was buried near his father and mother in the monastery of Batalha. In 1839 a monument to his memory was erected at Sagres. During the long period in which the prince was continuing his maritime explorations, he did not cease to cultivate the science of cartography. The geographer Jayme of Majorca superintended his school of navigation at Sagres, and at the prince's instance the

finest specimen of mediæval map-making that has been preserved was prepared at Venice under the superintendence of Fra Mauro of the Camaldolese convent of San' Miguel de Marano. The geographical knowledge of the 15th century is also shown by the famous Borgia map (see Plate II.), a bronze planisphere which came into the possession of Cardinal Borgia about 1794, and was published in 1797 by the cardinal's nephew. The Borgia map, however, is of the very beginning of the 15th century.

The progress of discovery for a time received a check from the death of Prince Henry, but only for a time. In 1462 Pedro de Cintra extended Portuguese exploration 600 miles beyond the furthest point reached by Cadamosto, and discovered Sierra Leone. Fernan Gomez followed in 1469, and opened the trade with the Gold Coast; and in 1484 Diogo Cam discovered the mouth of the Congo. The king of Portugal next despatched two vessels of 50 tons in August 1486, under the command of Bartholomeu Dias, to continue discoveries southwards; while, in the following year, he sent Pedro de Covilham and Affonso de Payva to discover the country of Prester John. Dias succeeded in rounding the southern point of Africa, which he named Cabo Tormentoso; but king João II., foreseeing the realization of the long-sought passage to India, gave it the enduring name of the Cape of Good Hope. Dias returned to Lisbon in December 1487; meanwhile Payva had died at Cairo; but Covilham, having heard that a Christian ruler reigned in the mountains of Ethiopia, penetrated into Abyssinia in 1490. He delivered the letter which João II. had addressed to Prester John to the negús Alexander of Abyssinia, but he was detained by that prince and never allowed to leave the country.

The results westward and eastward of the exertions of Prince Henry were the discovery of America by Columbus and of the Cape route to India by Vasco da Gama.

Christopher Columbus was born at Genoa about 1435. His name in Italian was Colombo, and in Spain he is known as Cristoval Colon. The fame of the Portuguese discoveries attracted strangers from all parts of the world, and in 1470 Columbus arrived at Lisbon. He was in Portugal from 1470 to 1484, during which time he made several voyages to the coast of Guinea in the Portuguese service. He married a daughter of Bartholomeu Perestrello, to whom Prince Henry had granted the commandship of Porto Santo, and lived for some time on that island. He learned, from many pilots experienced in the western voyages to the Azores, facts and signs which convinced him that there was an unknown land towards the west. Columbus also studied the *Imago Mundi* of Cardinal Pierre d'Ailly, whence he culled all he knew of Aristotle and Strabo; and he read the narrative of Marco Polo. By 1474 his grand project of discovery was established in his mind, and nothing afterwards could divert him from the pursuit of it. On the refusal of the king of Portugal to entertain his proposal, Columbus left Lisbon with his son in 1484, and he spent the interval until 1492 in appeals to the Spanish court. At length, having overcome all obstacles, he set sail with a fleet of three ships from Palos, on the 3d of August 1492, on his unprecedented and perilous voyage. On the 12th of October, having crossed the Atlantic, Columbus sighted land, which was named San Salvador. Mr Major has recently proved that this island is one of the Bahamas, now known as Watling Island. After discovering Cuba, Hispaniola, and many small islands, Columbus set sail on his return voyage on January 16, 1493, and arrived at Palos on the 15th of March. His reception in Spain was enthusiastic, and commensurate with the grandeur of his achievement, and on the 25th of September 1493 he sailed from Cadiz on his second voyage, with a fleet of three large ships and fourteen caravels. On the 3d of November he discovered the

island of Dominica, and during the voyage his discoveries included the Windward Islands and Jamaica. He returned to Cadiz on June 11, 1496; and it was not until May 30, 1498, that he set sail on his third voyage. The first land he came to formed a new discovery, which he named the island of Trinidad, and it was in this voyage that he reached the mainland of South America, and discovered the islands of Cubagua and Margarita. A colony had been formed on Hispaniola, and soon afterwards a judge named Francisco de Bobadilla arrived from Spain, having been sent, at the instigation of the great discoverer's enemies, to inquire into his conduct. Bobadilla seized upon the government, and sent Columbus home in chains. Ferdinand and Isabella were overwhelmed with shame, and the people with astonishment, on his arrival. He was at once released, and false promises of restitution and reward were profusely made. But Bobadilla was superseded, not by Columbus, but by Nicolas de Ovando. On the 9th of May 1502, however, Columbus was allowed to sail on a fourth and last voyage of discovery. He reached the island of Martinique on the 13th of June, and touched at Dominica and Hispaniola. Thence he sailed westward, discovering the coast of Veragua and the harbour of Porto Bello. After a stay in Jamaica, he set sail for Spain on the 12th of September 1504, and arrived at San Lucar on the 7th of November. He lived for two years longer, experiencing the blackest ingratitude from the Spanish court. At length, in debt and poverty, and bowed down by disappointment, this great man died May 20, 1506. His body was buried at Valladolid, and removed in 1513 to Cartuja de las Cuevas near Seville. A monument was erected over his grave, with the inscription—

A Castilla y Leon,
Nuevo Mundo dió Colon.

In 1536 the bodies of Columbus and his son Diego were transported to St Domingo; and thence they were removed to Havana in 1795. The ashes of the immortal discoverer now repose in the cathedral of Havana.

While Columbus was discovering a new world, the Portuguese continued their persevering efforts to reach India by sea. Vasco da Gama sailed from Lisbon on the 8th of July 1497 with four vessels built expressly for the voyage, the largest not exceeding 120 tons, and called the "Sam Gabriel." His brother Paolo commanded the "Sam Raphael," and the "Berrio" was under Nicolas Coelho. On November 23, with a fair wind, Da Gama rounded the Cape of Good Hope, and anchored in the bay named San Bras by Bartholomeu Dias, on the 25th. On Christmas Day he sighted land, which, on that account, he named Natal. He reached Mombas on the 7th of April, and on the 20th of May 1498 he anchored before Calicut. Da Gama returned to Lisbon in August 1499; and at his recommendation another fleet was fitted out, consisting of thirteen well-armed ships, under Pedro Alvarez Cabral, with Bartholomeu Dias and Nicolas Coelho under his orders. The expedition sailed on the 9th of March 1500; and on the 22d of April Cabral discovered the coast of Brazil, and took formal possession for the king of Portugal. Resuming his voyage to the East, he reached Calicut in September, and obtained permission to build a factory, establishing friendly relations also at Cananor and Cochin. He returned to Lisbon in July 1501. Vasco da Gama set sail, with a much larger fleet, on his second voyage in 1502. He visited several ports on the west coast of India, engaged in war as well as in commerce, and returned in September 1503. In 1503 Antonio da Saldanha and Affonso de Albuquerque sailed for India, and made terms of friendship with the chief of Quilon. Dom Francisco de Almeida, the first viceroy of the Indies, was sent out in 1505. He founded the ports of the Angediva and Cananor, and his son Laureço discovered Ceylon. Tristam da Cunha, with Affonso de

Albuquerque under his orders, was sent to occupy Socotraj and in 1506 Albuquerque came to India as second viceroy. He explored the coasts of Arabia and Persia, made the king of Ormus tributary to Portugal, and sent embassies to Abyssinia. In 1509 (?) a factory was established at Malacca; and on November 25, 1510, the great Albuquerque conquered Goa, and established the seat of his government there. In 1512 the Moluccas were discovered; and in 1517 Fernam Peres de Andrade reached China, and entered into commercial relations with the governor of Canton. In 1524 Vasco da Gama arrived in India for a third time, as viceroy, and landed at Goa on the 11th of September. He died at Cochin on the 24th of December 1524, and in 1538 his body was transported to Portugal, and buried in his tomb at Vidigueira, of which town he was count.

The voyages of Vasco da Gama revolutionized the commerce of the East. Until then the Venetians held the carrying trade of India, which was brought by the Persian Gulf and Red Sea into Syria and Egypt, the Venetians receiving the rich products of the East at Alexandria and Beyrout, and distributing them over Europe. This commerce was a great source of wealth to Venice; but after the discovery of the new passage round the Cape, and the conquests of the Portuguese, the trade of the East passed into other hands.

The achievements of Columbus and Da Gama are measurably enhanced when we consider the inadequate means at their disposal, their small and ill-formed ships, and their defective knowledge of navigation. The mariner's compass had been in use for nearly two centuries, and it was Columbus himself who first observed the phenomena of variation. But the compass and rough sea-card were the only appliances, until the learned Nuremberger, Martin Behaim, invented the application of the astrolabe to purposes of navigation, which enabled mariners to ascertain their latitude. This was in the year 1480. The astrolabe was used by Vasco da Gama on his first voyage round the Cape of Good Hope; but the movement of a ship rendered accuracy impossible, and the liability to error was increased by the necessity for three observers. One held the astrolabe by a ring passed over the thumb, the second measured the altitude, and the third read off. The astrolabe was a metal circle graduated round the edge, with a limb called the *alhidada* fixed to a pin in the centre, and working round the graduated circle. The instrument had two sights fitted upon it, one at each end, and was suspended by a ring so as to hang vertically on one hand, while the *alhidada* was worked up and down until the sun could be seen through both the sights. It then gave the zenith distance. The *Ordenanzas* of the Spanish council of the Indies record the course of instruction prescribed for pilots, which included the *De Sphæra Mundi* of Sacrobosco, the spherical triangles of Regiomontanus, the *Almagest* of Ptolemy, the use of the astrolabe and its mechanism, the adjustments of instruments, cartography, and the methods of observing the movements of heavenly bodies. The only observations employed by the ancients for finding the longitude were those of the eclipses of the moon, and it was not until 1610 that Galileo discovered another method by observation of Jupiter's satellites.

The discoveries of Columbus awakened a spirit of enterprise in Spain which continued in full force for a century; adventurers flocked eagerly across the Atlantic, and discovery followed discovery in rapid succession. Many of the companions of Columbus continued his work. Pinzon in 1499 reached the mouth of the Amazon; and in the same year Alonzo de Ojeda, accompanied by a Florentine named Amerigo Vespucci, touched the coast of South America somewhere near Surinam, following the shore as far as the Gulf of Maracaibo, Vespucci afterwards made three voyages

to the Brazilian coast; and in 1504 he wrote an account of his four voyages, which was widely circulated, and became the means of procuring for its author the high honour of giving his name to the whole continent. Mr Major has discussed the hitherto obscure question of the way in which the name "America" originated, in a paper distinguished for great learning and very able criticism. He has shown that the word "America" first appeared on the *Mappe Monde* drawn by Leonardo da Vinci, and he explains the chain of circumstances which led to its adoption. The first map known to exist with America delineated upon it is that drawn by Juan de la Cosa, the pilot of Columbus in his second voyage, which is dated 1500. Juan de la Cosa was with Ojeda and Vespucci, and afterwards with Ojeda in his last ill-fated expedition. In May 1507, just a year after the death of Columbus, one Martin Waldseemüller (Hylacomulus) wrote a work called *Cosmographie Introductio*, to which was appended a Latin edition of the four voyages of Vespucci. In this book, which was printed at St Dié in Lorraine, he proposed that the name of America should be given to the New World. In 1508 the first engraved map containing the New World appeared, in an edition of Ptolemy printed at Rome, but it does not bear the name of America. But in 1509 the name "America," proposed by Hylacomulus in 1507, appears, as if it was already accepted as a well-known denomination, in an anonymous work entitled *Globus Mundi*, published at Strasburg. This was three years before the death of Vespucci. The *Mappe Monde* of Leonardo da Vinci, to which Major assigns the date of 1514, has the name of America across the South American continent.

In 1508 Ojeda obtained the government of the coast of South America from Cabo de la Vela to the Gulf of Darien; and at the same time Diego Nicuesa was appointed governor of Veragua from the Gulf of Darien to Cape Gracias a Dios. The two adventurers arrived at Hispaniola together; but Ojeda set out first for his government, landed at Carthagena in 1510, and sustained a bloody defeat from the natives, in which his lieutenant, Juan de la Cosa, was killed. Ojeda then embarked, and eventually selected a site on the east side of the Gulf of Darien for his seat of government. Here he was again defeated by the natives, and, returning to Hispaniola for aid, he died there in extreme poverty. Nicuesa was still more unfortunate, and died at sea. The Spaniards in the Gulf of Darien were left by Ojeda under the command of Francisco Pizarro, the future conqueror of Peru. After suffering from famine and disease, Pizarro embarked the survivors in small vessels, but outside the harbour they met a ship which proved to be that of the bachiller Martin Fernandez Enciso, Ojeda's partner, coming with provisions and reinforcements. They all returned to their settlement called San Sebastian, but found that the Indians had destroyed the fort, and Enciso determined to abandon it. One of the crew of Enciso's ship, Vasco Nuñez de Balboa, the future discoverer of the Pacific Ocean, induced his commander to form a settlement on the other side of the Gulf of Darien. The soldiers became discontented and deposed Enciso, when Vasco Nuñez, a clever and courageous adventurer, took command of the Darien settlement in March 1511. Enciso was a man of learning, and an accomplished cosmographer. His work *Suma de Geografia*, which was printed in 1519, is the first Spanish book which gives an account of America. Vasco Nuñez, the new commander, entered upon a career of conquest in the neighbourhood of Darien, which ended in the discovery of the Pacific Ocean on the 25th of September 1513. In 1514 Pedrarias de Avila, an old man of rank and some reputation, but with no ability, and of a malicious disposition, was appointed to supersede Vasco Nuñez as governor of Darien, and the bachiller Enciso came out in his fleet. Pedrarias, on a false pretext, beheaded Vasco Nuñez in 1517, which

was one of the greatest calamities that could have happened to South America at that time; for the discoverer of the South Sea was on the point of sailing with a little fleet into his unknown ocean, and a humane and judicious man would have been the conqueror of Peru, instead of the cruel and ignorant Pizarro. In the year 1519 Panama was founded by Pedrarias; and the conquest of Peru by Pizarro followed a few years afterwards. Hernan Cortes overran and conquered Mexico from 1518 to 1521, and the discovery and conquest of Guatemala by Alvarado, of Florida by Hernando de Soto; and of Nueva Granada by Quesada, followed in rapid succession. The first detailed account of the west coast of South America was written by that keenly observant old soldier, Pedro de Cieza de Leon, who was travelling in South America from 1533 to 1550, and published his story at Seville in 1553.

But the great anxiety of the Spanish Government at that time was to find a westward route to the Moluccas. For this purpose Juan Diaz de Solis was despatched in October 1515, and in January 1516 he discovered the mouth of the Rio de la Plata. He was, however, killed by the natives, and his ships returned. In the following year Magellan laid before Charles V., at Valladolid, a scheme for reaching the Spice Islands by sailing westward. He had already served with his own countrymen, the Portuguese, on the coast of India and at the taking of Malacca, and he was an accomplished and resolute seaman. With a fleet of five ships, and the rank of captain-general, Magellan sailed from San Lucar on the 21st of September 1519. After touching on the coast of Brazil, at the Rio de la Plata, and at the ports on the east coast of Patagonia, Magellan entered the straits which bear his name in October 1520. In consequence of many fires being seen on the southern shores of the strait, he named that country Tierra del Fuego. The fleet, now consisting of the "Trinidad," "Vittoria," and "Concepcion," emerged from the strait and entered the Pacific Ocean on the 27th of November 1520. They then steered north-west, crossed the line on the 13th of February 1521, and on the 6th of March reached the Ladrones Islands. Thence Magellan proceeded to the Philippines. He was killed in an attack on the island of Matan, which he made in order to bring it under subjection to his ally the king of Zebu, on the 26th of April 1521. Thus fell this great navigator, who was second only to Columbus in the history of nautical exploration. His brother-in-law, Duarte Barbosa, was selected to succeed Magellan in command of the fleet, with João Serrao as his colleague. They were both killed in battles with the natives, and eventually a Biscayan named Sebastian del Cano, sailing home by way of the Cape of Good Hope, reached San Lucar in command of the "Vittoria" on the 6th of September 1522, with eighteen survivors. Del Cano was received with great distinction by the emperor, who granted him a globe for his crest, and the motto "Primus circumdedisti me."

While the Spaniards were circumnavigating the world and completing their knowledge of the coasts of Central and South America, the Portuguese were actively engaged on similar work as regards Africa and the East Indies.

In Abyssinia the mission of Covilham led to further intercourse. In April 1520 the Portuguese viceroy of the Indies took a fleet into the Red Sea, and landed an embassy consisting of Dom Rodriguez de Lima and Father Francisco Alvarez, a priest whose detailed narrative is the earliest and not the least interesting account we possess of Abyssinia. It was not until 1526 that the embassy was dismissed; and not many years afterwards the negus entreated the help of the Portuguese against Mahometan invaders, and the viceroy sent an expeditionary force, commanded by his brother Cristoforo da Gama, with 450 musketeers. Da Gama was taken prisoner and killed, but his Portuguese

enabled the Christians of Abyssinia to regain their power, and a Jesuit mission remained in the country. While Abyssinia was thus opened to the enterprise of the Portuguese on the east side of Africa, they also established a close connexion with the kingdom of Congo on the west side, and obtained much information respecting the interior of the continent. Duarte Lopes, a Portuguese settled in the country, was sent on a mission to Rome by the king of Congo, and Pope Sixtus V. caused him to recount to his chamberlain, Felipe Pigafetta, all he had learned during the nine years he had been in Africa, from 1578 to 1587. This narrative, under the title of *Description of the Kingdom of Congo*, was published at Rome by Pigafetta in 1591. A map was attached on which the two equatorial lakes, Victoria and Albert Nyanza, and Lake Tanganyika are shown, and the empire of Monomoezi or Uniamuezi is laid down. The most valuable work on Africa during the 16th century is, however, that written by Leo Africanus. This famous traveller was born at Granada, and retired into Africa when his native town was captured by the Spaniards. He travelled extensively in the north and west of Africa, and was eventually taken by pirates and sold to a master who presented him to Pope Leo X. At the pope's desire he translated his work on Africa into Italian, and died in about the year 1526.

In the East Indies the Portuguese acquired predominance influence at sea, establishing factories on the Malabar coast, in the Persian Gulf, at Malacca, and in the Spice Islands, and extending their commercial enterprises from the Red Sea to China. Their missionaries were received at the court of Akbar, and Benedict Goes, a native of the Azores, was despatched on a journey overland from Agra to China. He started in 1603, and, after traversing the least known parts of Central Asia, he reached the confines of China. He appears to have ascended from Cabul to the plateau of the Pamir, and thence onwards by Yarkand, Khotan, and Aksu. He died at a place called Socieu in March 1607; and thus, as one of the brethren pronounced his epitaph, "seeking Cathay he found heaven."

The activity and love of adventure, which became a passion for two or three generations in Spain and Portugal, spread to other countries. It was the spirit of the age; and England, Holland, and France soon began to enter upon the same glorious career. English enterprise was first aroused by John and Sebastian Cabot, father and son, who came from Venice and settled at Bristol in the time of Henry VII. The Cabots received a patent, dated March 5, 1496, empowering them to seek unknown lands; and John Cabot discovered Newfoundland and part of the coast of America. Sebastian afterwards made a voyage to Rio de la Plata in the service of Spain, but he returned to England in 1548, and received a pension from Edward VI. "in consideration of the good and acceptable services done and to be done." He was placed at the head of the Society of Merchant Adventurers, and, by his knowledge and experience, he was the means of keeping alive the spirit of enterprise in England, and of extending her foreign commerce. At his suggestion a voyage was undertaken for the discovery of a north-east passage to Cathay, with Sir Hugh Willoughby as captain-general of the fleet, and Richard Chancellor as pilot-major. They sailed in May 1553, but Willoughby and all his crew perished in a harbour on the Lapland coast. Chancellor, however, was more fortunate. He reached the White Sea, performed the journey overland to Moscow, where he was well received, and may be said to have been the founder of the trade between Russia and England. He returned to Archangel and brought his ship back in safety to England. On a second voyage, in 1556, Chancellor was drowned; and three subsequent voyages, led by Stephen Burrough, Pet, and Jackman, effected

an examination of the straits which lead into the Sea of Kara.

The French followed closely on the track of John Cabot, and the hardy Norman and Breton seamen frequented the banks of Newfoundland at the commencement of the 16th century. In 1524 Francis I. sent Giovanni da Verazzano of Florence on an expedition of discovery to the coast of North America; and the details of his voyage were embodied in a letter addressed by him to the king of France from Dieppe, in July 1524. On April 20, 1534, Jacques Cartier sailed from St Malo with two vessels of 60 tons each, for the purpose of continuing the discoveries of Verazzano, and he visited Newfoundland and the Gulf of St Lawrence. In the following year he made another voyage, discovered the island of Anticosti, and ascended the St Lawrence to a place called Hochelaga, now Montreal. He returned, after passing two winters in Canada; and on another occasion he also failed to establish a colony. Admiral de Coligny made several unsuccessful endeavours to form a colony in Florida under Jean Ribault of Dieppe, René de Laudonnière, and others, but the settlers were furiously assailed by the Spaniards and the attempt was abandoned.

The reign of Elizabeth is famous for the gallant enterprises that were undertaken by sea and land to discover and bring to light the unknown parts of the earth. The great promoter and father of English geographical discovery was Richard Hakluyt, who was born near London in 1553. He was at Westminster School, and when quite a boy he imbibed a love for cosmography and maritime discovery. At Oxford he read all the narratives of voyages and travels that came within his reach, and delivered lectures on cartography. In 1585 he was at Paris, as chaplain to the English embassy, and in 1605 he became a prebendary of Westminster. He was the chief promoter in the formation of the two companies for colonizing Virginia in 1606; and he devoted his life to the encouragement of similar undertakings, and to their record. Hakluyt died in 1616, and was buried in Westminster Abbey. He was incessantly employed in the collection, examination, and translation of accounts of voyages and travels, and of charters, letters, and other documents bearing on the subject, and in correspondence with men eager either to impart or receive information. Sir Philip Sidney, Sir Francis Walsingham, Lord Thomas Howard, and Sir Francis Drake were among those who supported and encouraged him, and Ortelius and Mercator were his correspondents. His first work was the *Divers Voyages touching the Discoverie of America*; and the second was brought out while he was in Paris in 1586, entitled *A Notable Historie containing Foure Voyages made by French Captaynes unto Florida*. In 1587 he published at Paris a revised edition of the *De Orbe Novo* of Peter Martyr Anghiera. His *Principal Navigations* was published in folio in 1589, and dedicated to Sir Francis Walsingham; and the new edition, in three volumes, appeared in 1598. Hakluyt also got translations made of Leo Africanus, of Mendoza's *History of China*, and of Galvano's *Discoveries of the World*, which were published. His last publication was a translation of Hernando de Soto's discoveries in Florida. He left many valuable papers at his death, most of which, together with a vast number of other narratives, were published in 1622 in the great work of the Rev. Samuel Purchas, entitled "Hakluytus Posthumus, or Purchas his Pilgrimes."

It is from the rich treasure-house of Hakluyt and Purchas that our knowledge of the gallant deeds of the English and other explorers of the Elizabethan age is mainly derived. The great collections of voyages and travels of De Bry and Hulsius served a similar useful purpose on the continent of Europe. One important object of English maritime adven-

English
enter-
prise.
The
Cabots.

Age of
Elizabeth.
Hakluyt.

turers of those days was to discover a route to Cathay by the north-west, a second was to settle Virginia, and a third was to beat up the Spanish settlements in the Indies. Nor was the trade to Muscovy and Turkey neglected; while latterly a resolute and successful attempt was made to establish commercial relations with East India.

Martin Frobisher led the way in the direction of the north-west, sailing from the Thames in 1576, and sighting the southern part of Greenland on the 11th of July. In this voyage he discovered a part of the coast of Labrador, and the strait (now known to be a deep bay) which bears his name. He brought home some stones which were believed to be gold, and the consequence was that there arose an eager desire to obtain more. Many speculators subscribed, and Frobisher was sent out on a second voyage, "more for the searching of this gold ore than for the searching any further discovery of the passage." He left Gravesend on May 27, 1577, wasted his time in picking up stones on the shores of Frobisher's Strait, and returned on the 22d of August. The excitement about the gold ore still continued. The queen gave the name of *Meta Incognita* to the newly discovered country; and on May 21, 1578, Frobisher set out on a third voyage with a fleet of fifteen ships. After touching at Greenland, they made for the opposite shore through an ice-encumbered sea, and the fleet was separated during a heavy gale. They reached various ports in England during October, and by that time the bubble about the gold ore had burst, and the enterprise was considered a failure. The first of the three voyages alone was a voyage of discovery.

In 1585 John Davis, an admirable seaman and most resolute explorer, was employed by some merchants, chief among whom was Mr William Sanderson of London, to take up the glorious work where Frobisher had left off. He sailed from Dartmouth on the 7th of June 1585, and, reaching the south-west coast of Greenland, he called it the "Land of Desolation." He then stood over to the opposite coast, which he examined in the neighbourhood of Cape Walsingham, returning to Dartmouth on September 30. In 1588 he sailed on the 7th of June and coasted along Greenland, having friendly intercourse with the Eskimo. He also examined part of the Labrador coast. In his third voyage he sailed from Dartmouth on the 17th of May, and sighted Greenland on the 14th of June. On this occasion he went as far north as 72° 12', naming the great island bluff—which is now so well known to voyagers up Baffin's Bay—"Sanderson his Hope of a North-West Passage." Crossing over Davis Strait, the bold explorer discovered the strait which now bears the name of Hudson. Davis was followed in his northern voyages by Waymouth, Hall, and Knight; and in 1607 Henry Hudson was despatched on a voyage of discovery in a small vessel of 80 tons. He sighted the east coast of Greenland in 73° N., examined the north-west end of Spitzbergen, as far as a point which he named Hakluyt Headland, and reached 80° 23' N. In 1608 he made a second voyage, during which he examined the edge of the ice between Spitzbergen and Greenland. In his third voyage, in 1609, he was employed by the Dutch, and discovered the Hudson River. In 1610 he was again employed by English merchants, and entered Hudson's Bay, but was infamously abandoned in an open boat by his crew. In 1612 Sir Thomas Button continued the exploration of Hudson's Bay, which was completed by Thomas James and Luke Fox in 1631.

In 1616 the little bark "Discovery," of 35 tons, was fitted out by those persevering adventurers Sir Thomas Smith, Sir Dudley Digges, John Wolstenholme, and Alderman Jones, for another attempt in the icy seas. This was the most successful Arctic voyage of the 17th century. Robert Bylot was appointed master of the "Discovery," and

William Baffin was pilot. They sailed from Gravesend, with 17 souls on board, on the 26th of March, and were off Hope Sanderson, the extreme point of Davis, on the 30th of May. The "Discovery" reached what is now called "the north water" of Baffin's Bay on the 1st of July, and, after discovering the head of the great bay which bears his name, the pilot Baffin returned by sailing down the west side of it. On August 30 the "Discovery" was again safely anchored in Dover roads. It was exactly 200 years before any other vessel followed in her track, and reached "the north water." Both Davis and Baffin afterwards served and were killed in the East Indies.

The Dutch emulated the English in the Arctic seas during this period. Their merchants opened a trade with Kola and Archangel as early as 1578, but the difficulty of penetrating into the Sea of Kara led them to try the possibility of finding a passage round the northern end of Novaya Zemlya. The credit of the conception of this voyage is due to the great cosmographer Peter Plancius, and the merchants of Amsterdam adopted the idea, and despatched a vessel of 100 tons called the "Mercurius," under the command of William Barents. He sailed from the Texel on June 4, 1594, and sighted Novaya Zemlya on the 4th of July. Sailing northwards along the coast he rounded Cape Nassau and reached the edge of the ice. For many days he perseveringly sought for a passage through it. In his second voyage he merely went to the entrance of the Sea of Kara. But his third voyage was the most important. Heemskerck was the commander, Barents was pilot, and the mate, Gerrit de Veer, was the historian of the voyage. They sailed from Amsterdam on May 13, 1596. On June 19, Spitzbergen was discovered, and the whole western coast and part of the northern examined. The record of the subsequent proceedings of Barents and his crew, of their famous voyage round the north-western end of Novaya Zemlya, and of their terrible sufferings in the first Arctic winter ever faced by Europeans, is deeply interesting as it is told in the simple narrative of Gerrit de Veer. Barents had long been ill, and when they set sail from their dismal winter harbour on June 14, 1597, in open boats, he was too weak to stand, and was carried from the house. He died on the 19th, and found a grave in the midst of his discoveries.

The maritime enterprise of England, in the days of Elizabeth, was mainly directed towards the discovery of a north-west passage; but many voyages were also made to Guinea and the West Indies, and twice English vessels followed in the track of Magellan, and circumnavigated the globe.

In 1577 Francis Drake, who had previously served with Hawkins in the West Indies, undertook his celebrated voyage round the world. His fleet consisted of three ships and two pinnaces, which were broken up during the voyage. The ships were the "Pelican" of 100 tons, on board of which Drake himself embarked, the "Elizabeth" of 80, and the "Marigold" of 30 tons. After some stay at Port San Julian on the coast of Patagonia, the fleet entered the Straits of Magellan on the 20th of August 1578, when Drake changed the name of his ship to the "Golden Hind." They reached the western entrance on the 6th of September, and soon afterwards the "Marigold" parted company in a gale of wind, and was never heard of again, while the "Elizabeth" basely deserted her consort and returned to England. Drake, in the "Golden Hind," continued the voyage alone. At first he was driven to the southernmost point of Tierra del Fuego, and thus discovered that there was a passage, though he did not round Cape Horn. He then proceeded northward along the west coast of America, touching at the island of Mocha off the Chilean coast; at Valparaiso, Coquimbo, Tarapaca, Arica, Callao, and Payta. Off Cape

San Francisco, nearly on the equator, he captured a very rich Spanish treasure-ship called the "Cacafuego"; and it is right to observe that England was then at peace with Spain. Drake resolved to attempt the discovery of a passage from the Pacific to the Atlantic, and with this object he continued to shape a course northwards along the American continent. On the 5th of June 1579 the "Golden Hind" reached her most northern point in 48°, when the attempt was abandoned, and Drake put into a harbour to refit, named Port Drake, which appears to have been the modern harbour of San Francisco, on the coast of California. The coast from the southern extremity of the Californian peninsula to Cape Mendocino was discovered by Juan Rodriguez Cabrillo and Francisco de Ulloa in 1539. Drake's discoveries extend from Cape Mendocino to 48° N.

Leaving California, Drake sailed across the Pacific and reached the Philippine Islands in October. He touched at Ternate and Java, and rounded the Cape of Good Hope on June 15, 1580. The "Golden Hind" anchored safely at Plymouth on the 26th of the following September. Drake was graciously received and knighted by the queen, and the "Golden Hind," the first English ship that circumnavigated the globe, was preserved for many years at Deptford. When at last she was broken up, a chair was made from one of her planks and presented to the university of Oxford.

Mr Thomas Cavendish, a gentleman of Suffolk, emulous of Drake's example, fitted out three vessels for an expedition to the South Sea, and sailed from Plymouth on July 21, 1586. Cavendish passed through Magellan's Straits in January 1587, and, taking the same route as Drake along the west coast of America, he reached Mazatlan in September. A rich Spanish treasure-ship was captured off Cape San Lucas, the southern extremity of California, on the 4th of November, and Cavendish then steered across the Pacific, seeing no land until he reached the Ladrone Islands. He arrived safely at Plymouth on the 9th of September 1588. The third English voyage into the Pacific was not so fortunate. Sir Richard Hawkins sailed from Plymouth on the 12th of June 1593 in the good ship "Dainty," passed through Magellan's Straits, and all went well until they reached the bay of Atacames, 57 miles north of the equator, in June 1594. Here the English were attacked by a Spanish fleet, and, after a desperate naval engagement, Hawkins was forced to surrender. Hawkins declared his object to be discovery and the survey of unknown lands, and his voyage, though terminating in disaster, bore good fruit. *The Observations of Sir Richard Hawkins in his Voyage into the South Sea*, published in 1622, are very valuable, and form the most charming work of the kind which was written during that period. It was long before another English ship entered the Pacific Ocean. Sir John Narborough took two ships through the Straits of Magellan in 1670 and touched on the coast of Chili; but it was not until 1685 that Cook and Dampier sailed over the part of the Pacific where, nearly a century before, the "Dainty" had to strike her flag to the Spaniard.

The exploring enterprise of the Spanish nation did not wane after the conquest of Peru and Mexico, and the acquisition of the vast empire of the Indies. It was rather spurred into renewed activity by the audacity of Sir John Hawkins in the West Indies, and by the appearance of Drake, Cavendish, and Richard Hawkins in the Pacific.

In the interior of South America the Spanish conquerors had explored the region of the Andes from the isthmus of Panama to Chili; and in 1541 Francisco de Orellana discovered the whole course of the Amazon from its source in the Quitoian Andes to the Atlantic. A second voyage down the great river was made in 1561 by the mad pirate Lope de Aguirre; but it was not until 1639 that a full

account was written of the mighty stream by Father Cristoval de Acuña, who ascended it from its mouth to the city of Quito. The voyage of Drake across the Pacific was preceded by that of Alvaro de Mendaña, who was despatched from Peru in 1567 to discover the Australian land which was believed to exist in the South Sea. After a voyage of eighty days across the Pacific, Mendaña discovered the Salomon Islands; and the expedition returned in safety to Callao. The appearance of Drake on the Peruvian coast led to an expedition being fitted out at Callao, to go in chase of him, under the command of Pedro Sarmiento. He sailed from Callao in October 1579, and made a careful survey of the Straits of Magellan, with the object of fortifying that entrance to the South Sea. The colony which he afterwards took out from Spain was a complete failure, and is only remembered now from the name of "Port Famine" which Cavendish gave to the site at which he found the starving remnant of Sarmiento's settlers. In June 1595 Mendaña sailed from the coast of Peru in command of a second expedition to colonize the Salomon Islands. After discovering the Marquesas, he reached the island of Santa Cruz of evil memory, where he and many of the settlers died. His young widow took command of the survivors and brought them safely to Manila. The viceroys of Peru still persevered in their attempts to plant a colony in Australia. Pedro Fernandez de Quiros, who was pilot under Mendaña and Luis Vaez de Torres were sent in command of two ships to continue the work of exploration. They sailed from Callao on December 21, 1605, and discovered several islands of the New Hebrides group. They anchored in a bay of a large island which Quiros named "Australia del Espiritu Santo." From this place Quiros returned to America, but Torres continued the voyage, passed through the strait between Australia and New Guinea which bears his name, and explored and mapped the southern and (as has recently been proved) also the eastern coast of New Guinea.

The Portuguese, in the early part of the 17th century (1578-1640), were under the dominion of Spain, and their enterprise was to some extent damped; but their missionaries extended geographical knowledge in Africa. Father Francisco Paez acquired great influence in Abyssinia, and explored its highlands from 1600 to 1622. Fathers Mendez and Lobo traversed the deserts between the coast of the Red Sea and the mountains, became acquainted with the shores of Lake Tsana, and discovered the sources of the Abai or Blue Nile in 1624-1633.

But the attention of the Portuguese was mainly devoted to vain attempts to maintain their monopoly of the trade of India against the powerful rivalry of the English and Dutch. The English enterprises were persevering, continuous, and successful. James Lancaster made a voyage to the Indian Ocean from 1591 to 1594; and in 1599 the merchants and adventurers of London resolved to form a company, with the object of establishing a trade with the East Indies. On the 31st of December 1599 Queen Elizabeth granted the charter of incorporation to the East India Company, and Sir James Lancaster, one of the directors, was appointed general of their first fleet. He was accompanied by John Davis, the great Arctic navigator, as pilot-major. This voyage was eminently successful. The ships touched at Achin in Sumatra and at Java, returning with full ladings of pepper in 1603. The second voyage was commanded by Sir Henry Middleton; but it was in the third voyage, under Keelinge and Hawkins, that the mainland of India was first reached in 1607. Captain Hawkins landed at Surat and travelled overland to Agra, passing some time at the court of the Great Mogul. In the voyage of Sir Edward Michelborne, John Davis of Arctic fame lost his life in a fight with a Japanese junk on December 27, 1605. The

eighth voyage, led by Captain Saris, extended the operations of the company to Japan; and in 1613 the Japanese Government granted privileges to the Company: but the English retired in 1623, giving up their factory. The chief result of this early intercourse between England and Japan was the interesting series of letters written by William Adams from 1611 to 1617. Adams, however, though an Englishman, went to Japan in a Dutch ship. From the tenth voyage of the East India Company, commanded by Captain Best, who left England in 1612, dates the establishment of permanent English factories on the coast of India. It was Captain Best who secured a regular firman for trade from the Great Mogul. From that time a fleet was despatched every year, and the Company's operations greatly increased geographical knowledge of India and the Eastern Archipelago.

The visits of Englishmen to Eastern countries, at this time, were not confined to the voyages of the Company. Journeys were also made by land, and, among others, Thomas Coryat, of Ocombe in Somersetshire, walked from France to India, and died in the Company's factory at Surat. In 1561 Mr Anthony Jenkinson arrived in Persia with a letter from Queen Elizabeth to the shah. He travelled through Russia to Bokhara, and returned by the Caspian and Volga. In 1579 Christopher Burroughs built a ship at Nijni Novgorod and traded across the Caspian to Baku; and in 1598 Sir Anthony and Robert Shirley arrived in Persia, and Robert was afterwards sent by the shah to Europe as his ambassador. He was followed by a Spanish mission under Garcia de Silva, who wrote an interesting account of his travels; and to Sir Dormer Cotton's mission, in 1628, we are indebted for Sir Thomas Herbert's charming narrative. In like manner, Sir Thomas Roe's mission to India resulted not only in a large collection of valuable reports and letters of his own, but also in the detailed account of his chaplain Mr Terry. But the most learned and intelligent traveller in the East, during the 17th century, was the German Kœmpfer, who accompanied an embassy to Persia in 1684, and was afterwards a surgeon in the service of the Dutch East India Company. He was in the Persian Gulf, India, and Java, and resided for more than two years in Japan, from 1690 to 1692. His *History of Japan* was published in England in 1727, Kœmpfer himself having died in 1716. From these various sources a considerable increase was made in the knowledge of India, Persia, and the further East.

The Dutch nation, as soon as it was emancipated from Spanish tyranny, displayed an amount of enterprise which, for a long time, was fully equal to that of England. The memorable Arctic voyages of Barents were quickly followed by the establishment of a Dutch East India Company; and Holland, ousting the Portuguese, not only established factories on the mainland of India and in Japan, but acquired a preponderating influence throughout the Eastern Archipelago. In 1583 Jan Hugen van Linschoten made a voyage to India with a Portuguese fleet, and his full and graphic descriptions of India, Africa, China, and the Eastern Archipelago must have been of no small use to his countrymen in the commencement of their distant voyages. The first of their Indian voyages was performed by ships which sailed from Holland in April 1595, and rounded the Cape of Good Hope. A second large Dutch fleet sailed in 1598; and, so eager was the young republic to extend her commerce over the world that another fleet, consisting of five ships of Rotterdam, was sent in the same year by way of Magellan's Straits, under Jacob Mahu as admiral, with William Adams as pilot. Mahu died on the passage out, and was succeeded by Simon de Cordes, who was killed on the coast of Chili. In September 1599 the fleet had entered the Pacific. The ships were then steered direct

for Japan, and anchored off Bungo in April 1600. In the very same year, 1598, a third expedition was despatched under Oliver van Noort, a native of Utrecht. The fleet left Holland in September 1598, and entered the South Sea, through the Straits of Magellan, in February 1600, after a tedious, and in truth unskillful, navigation of nearly a year and a half from the time of leaving Holland. After keeping along the west coast of America nearly as far as the line, Van Noort shaped a course for the Ladrone Islands, and arrived off Manila. In August 1601 he anchored in front of Rotterdam, after an absence of three years, but the voyage contributed nothing to geography. The Dutch Company in 1614 again resolved to send a fleet to the Moluccas by the westward route, and Joris Spilbergen was appointed to the command as admiral, with a commission from the States-General. He was furnished with 4 ships of Amsterdam, 2 of Rotterdam, and 1 from Zealand. On May 6, 1615, Spilbergen entered the Pacific Ocean, and touched at several places on the coast of Chili and Peru, defeating the Spanish fleet in a naval engagement off Chilca. After plundering Payta and making requisitions at Acapulco, the Dutch fleet crossed the Pacific and reached the Moluccas in March 1616. At that time the Dutch Company had 37 sail of European shipping and 3000 troops in the East Indies.

The Dutch now resolved to discover a passage into the Pacific to the south of Tierra del Fuego, the existence of which was ascertained by Sir Francis Drake. The vessels fitted out for this purpose were the "Eendracht," of 360 tons, commanded by Jacob le Maire, and the "Horn," of 110 tons, under Jan Schouten. They sailed from the Texel on June 14, 1615, and by the 20th of January 1616 they were south of the entrance of Magellan's Straits. Passing through the strait of Le Maire they came to the southern extremity of Tierra del Fuego, which was named Cape Horn, in honour of the town of Horn in West Friesland, of which Schouten was a native. They passed the cape on the 31st of January, encountering the usual westerly winds. The great merit of this discovery of a second passage into the South Sea lies in the fact that it was not accidental or unforeseen, but was due to the sagacity of those who designed the voyage. On March 1 the Dutch fleet sighted the island of Juan Fernandez; and, having crossed the Pacific, the explorers sailed along the north coast of New Guinea, and arrived at the Moluccas on September 17, 1616. In 1623 the Dutch sent expeditions against Brazil and Peru, which, however, did little to advance geographical knowledge, except that the Brazilian invasion resulted in the valuable work of Nieuhof.

There were several early indications of the existence of the great Australian continent, which have been very ably discussed by Mr Major; and the Hollanders endeavoured to obtain further knowledge concerning the country and its extent; but only its northern and western coasts had been visited before the time of Governor Van Diemen. Dirk Hartog had been on the west coast in latitude 26° 30' S. in 1616. Pelsert struck on a reef called "Houtman's Abrolhos" on June 4, 1629. In 1697 the Dutch captain Vlamingh landed on the west coast of Australia in 31° 43' S., and named the Swan River, where he saw some black swans. In 1642 the governor and council of Batavia fitted out two ships to prosecute the discovery of the south land, and entrusted the command to Captain Abel Jansen Tasman. This voyage proved to be the most important to geography that had been undertaken since the first circumnavigation of the globe. Tasman sailed from Batavia in the yacht "Heemskirk" on the 14th of August 1642, and from Mauritius on the 8th of October. On November 24 high land was sighted in 42° 30' S., which was named Van Diemen's Land, and, after landing there, sail was again

made, and New Zealand (at first called Staten Land) was discovered on the 14th of December. Tasman communicated with the natives and anchored in what he called Murderer's Bay. From New Zealand it was resolved to steer eastward to longitude 220°, and then north. On this course the ships arrived at Tongatabu, one of the Friendly Islands of Cook; in April 1643 they were off the north coast of New Guinea; and on June 15 Tasman returned to Batavia. In 1644 Tasman made a second voyage to effect a more full discovery of New Guinea.

The French directed their enterprise more in the direction of North America than of the Indies. One of their most distinguished naval worthies was Samuel Champlain, a native of Brouage in Saintonge, whose friend and patron was Aymar de Chastes, governor of Dieppe, a devoted follower of Henry IV. Champlain after the close of the war with the League in Brittany, in which he served, made a remarkable journey through Mexico and the West India Islands from 1599 to 1602, and on his return he found that M. de Chastes was, undeterred by previous failures, resolved to undertake the establishment of a colony in Canada. Champlain was sent on a voyage of reconnaissance, and on his return he found that the Sieur de Chastes was dead. In 1603 the Sieur de Monts was named vice-admiral of the coasts of Acadia, and Champlain sailed with him from Dieppe. He was for some years engaged in surveying all the coasts of Acadia and Cape Breton, and in 1607 he returned to France with De Monts. In the following year another attempt was made. Champlain, with a colleague named Du Pont Gravé, sailed to the St Lawrence, and on July 3, 1608, they first arrived at Quebec. In 1609 Champlain ascended the Iroquois to the lake which still bears his name. By 1611 a regular colony was established at Quebec; and in 1620 Champlain was installed as governor. He died towards the end of the year 1635. Champlain was an able navigator and a resolute explorer, and he made a very large addition to the knowledge of Canada and Acadia (Nova Scotia).

The last expedition of the 17th century was purely scientific. In 1699 Edmund Halley, the astronomer-royal, in command of the "Paramour Pink," undertook a voyage to improve the knowledge of longitude, and of the variation of the compass. The results of his voyage were the construction of a variation chart, and proposals for finding the longitude by occultations of fixed stars.

During the 17th century very considerable progress was made in the art of navigation, and in systematizing and delineating the vast mass of material that was accumulated by the ceaseless activity of explorers. The Dutch took the lead as map-makers. Mercator invented the useful projection which bears his name; and Ortelius, Hondius, and Hulsius compiled a series of valuable maps. In finding the latitude at sea, the astrolabe very generally gave place to the cross-staff, because the graduation of the latter was larger and more easily read off. The cross-staff was a very simple instrument, consisting of a graduated pole with cross pieces, called transversaries (of which there were four used according to the altitude), also graduated, which were fitted to work on it. The bearings of the sun were taken by compass, to ascertain when it was near the meridian; then the end of the long staff was placed close to the observer's eye, and the transversary moved until one end exactly touched the horizon, and the other the sun's centre. This was continued until the sun dipped, when the meridian altitude was obtained. The back-staff was an improvement on the cross-staff, invented by the great Arctic navigator John Davis. It was fitted with a reflector, and it was thus the first rough idea of the principle of the quadrant and sextant. The cross-staff was used for low altitudes, because both ends of the transversary could easily be seen at the same

time, and the astrolabe for high altitudes. With the invention of these instruments came instructions for their use, and for working out observations. In England the first of these was *The Old Rutter of the Sea*, printed in 1490. Then followed the *Seaman's Secrets* of John Davis, and *A Regiment of the Sea, containing very necessary Matters, with a perfect Sea Curd*, by Thomas Hood, published in 1596. Hood also sold compasses constructed on Mr Norman's principle, near the Minories. These manuals contained definitions, treatises on the use of the sea card and compass, tables of declination and rules for applying it, rules for dead reckonings and longitude, and instructions in the use of instruments. Latitude was obtained by observation, but longitude had usually to be reckoned on the chart from the meridian of Grand Canary, which in those days was used by all civilized countries. The differences of time between the eclipses of the moon at the place of the observer and the place for which it was calculated in the *ephemerides* for that day was another method in use of finding the difference of longitude. Mariners were also provided with tables giving the number of miles in a degree of longitude for every degree of latitude. Much attention was bestowed upon the phenomena of the variation and dip of the magnetic needle. Robert Norman, the hydrographer, discovered the dip or inclination of the needle in 1576, and in 1581 he observed the variation of the compass at London; and found it to be 11° 15' E. In the same year his *Discourse of the Magnet or Loadstone* was published by Ballard. In 1580 Mr Borough, comptroller of the navy, found the variation of the compass at Limehouse to be 11° 19' E. It may be observed here that in 1657 there was no variation at London, and that it moved westerly until 1815, when it was 24° 27' W. It is now returning eastwards.

By means of these rough instruments and calculations our Elizabethan navigators and their contemporaries succeeded in delineating the vast regions that were discovered. Thus the sum of human knowledge was augmented, while men's minds were enlarged, and the wealth and prosperity of nations were increased, through the provision of safe guides by which lands and seas could be traversed, and distant countries visited.

In the 18th century, to a far greater extent than had ever been the case before, geography began to be cultivated for its own sake, and expeditions were fitted out with the objects of discovery and of acquiring knowledge. The same objects also generally formed part of those enterprises which were avowedly undertaken for conquest, in the search of wealth, or from motives of religious zeal.

The improvement of scientific apparatus naturally went hand in hand with the progress of discovery. The great desideratum was the means of finding the longitude; and it was the creation of a commission for the discovery of longitude in 1713 which, so far as England is concerned, gave the greatest stimulus to inventions connected with geographical research. To the Board of Longitude is due the conception of the *Nautical Almanac*, and the establishment of a surveying branch of the naval service. The *Nautical Almanac* first appeared in 1767, under the auspices of Dr Maskelyne, the astronomer-royal, who, by furnishing tables of lunar distances, supplied another means of finding the longitude. The invention by Hadley, in 1731, of the quadrant for use at sea, which entirely superseded the astrolabe and cross-staff, was a still greater improvement; and it was soon followed by better instruments on the same principle—the sextants of Dollond and Troughton. The work of travellers on land also became more accurate in proportion as instruments and maps were improved. Early explorers by land were content with itineraries and maps which only indicated distances. The introduction of observations by compass bearings was an important improve-