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Address by the President, Sir Clements R. Markham, K. C. B.

Author(s): Clements R. Markham

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VOL. XXI.

COMMEMORATION OF THE REIGN OF QUEEN ELIZABETH.

THE meeting of the Society on March 23 was devoted to the commemoration of the great geographical and exploring enterprises of the reign of Queen Elizabeth, in connection with the tercentenary of her death. Addresses were given by the President, Mr. Edmund Gosse, Mr. Julian Corbett, and Prof. Silvanus Thompson. At the same time there was an exhibition of books, maps, atlases, portraits, instruments, medals, and other objects relating to the great enterprises of this reign, many of them being kindly lent by public institutions and private individuals. The following are the addresses which were given at the meeting:—

I.

Address by the President, Sir CLEMENTS R. MARKHAM, K.C.B.

Let us not forget. On this tercentenary of the death of Queen Elizabeth especially, let us not forget that the beginnings of nearly every department of our science date from the labours of Elizabethan worthies. A geographer should know the history of each branch of his work, tracing its advances from generation to generation, and keeping in memory the beginners and the improvers whose work we inherit. A commemoration such as the one for which we are assembled this evening is intended and, I think, calculated to renew such knowledge, to freshen such memories. An accomplished writer has very truly said that "much interesting and even precious intellectual treasure is continually being lost through forgetfulness, and becomes again new if faithfully set forth once more." Our work to-night is faithfully to set forth the beginnings of our science during the great Queen's reign, that their history may not be forgotten, but become again new.

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Queen Elizabeth was the fortunate sovereign of our first great discoverers and explorers, of our first really eminent compiler of voyages of discovery and exploration, of the enlightened and munificent promoters of geographical research, of our first accurate cartographers, of the authors of our first navigation books, of our first instrument-makers, of our first magnetic observers, of all those who laid the foundations of English geography on a scientific basis. There were several causes for this extraordinary activity during the memorable reign we commemorate, but the personality of the Sovereign, and the affectionate devotion she inspired, were, I am certain, not the least among these causes.



THE "ARMADA MEDAL." STRUCK BY QUEEN ELIZABETH TO COMMEMORATE THE DESTRUCTION OF THE SPANISH ARMADA, JULY 29 TO AUGUST 7, 1588.

The names of the great Queen's explorers and discoverers are still household words among us after three centuries—Raleigh and Humphrey Gilbert, Hawkins, Drake, and Cavendish, Burroughs, Frobisher, and Davis, and Lancaster; and among travellers by land, Jenkinson and Fitch. There were many others, but these stand forth pre-eminent. Sir Walter Raleigh's services will be in abler hands than mine. Sir Humphrey Gilbert, the distinguished soldier and advocate of Arctic discovery, was an Eton boy. He founded the first British colony, and his memorable last words were a fitting close to an heroic life. They shed a lustre on the annals of his country, and on the annals of his old school. Another Eton boy, to be mentioned directly, did good work for geography in Queen Elizabeth's time.

To Sir John Hawkins and his son Richard we owe the voyages to the coast of Guinea, to the West Indies and Florida, to Magellan's strait, and the west coast of the Pacific. But we owe much more. Sir John was an honest public servant and a diligent reformer. He put a stop to many abuses as treasurer and comptroller of the navy, and of course made enemies ; but he never lost the Queen's confidence. Aided by Drake, he instituted a fund for wounded and worn-out sailors, which was long



SIR JOHN HAWKINS.
(From a wood engraving.)

known as the "Chest at Chatham." Sir John Hawkins was one of the best of Elizabeth's great sea-captains. He was a thorough seaman, and an able and upright administrator. Endowed with great courage and unflinching presence of mind, "he was merciful," says Maynard, "apt to forgive, and faithful to his word." His son Richard was a true chip of the old block. His 'Observations' show that he was something more than an explorer. They are full of shrewd remarks on all that appertains to a ship and its furniture ; and, above all, they show the thought he

gave and the care he took for the health and comfort of the sailors. Both father and son were splendid types of English maritime explorers.

The deeds of a still greater seaman, Sir Francis Drake, will be dealt with presently by an abler hand than mine; then we have Thomas Cavendish, the second circumnavigator, and the Arctic voyagers, Frobisher, Burroughs, and Davis, who first introduced their countrymen to floes and icebergs, and described the perils of ice-navigation. Frobisher made three voyages to the land on the west side of Davis strait, which the Queen named "Meta Incognita." Burroughs was not only a polar explorer, but also an excellent hydrographer, and a scientific student of astronomy and magnetism. The discoveries of John Davis are shown on the Stockholm chart more particularly. They led directly to further discoveries. What he called his "Furious Overfall" lighted Hudson into his strait, and his famous cliff known as "Sander-son's Hope" lighted Baffin into his northern bay. Davis also was a scientific seaman and pilot, as well as a discoverer. He wrote the 'Seamen's Secrets,' and invented the back staff, and he piloted the first fleet of the East India Company round the Cape. James Lancaster of Basingstoke was another great sea-captain, the first to round the Cape of Good Hope, and the commander of the first fleet of the East India Company.

Elizabeth's travellers by land exceeded, in the length and importance of their journeys, all Englishmen that had gone before them. Anthony Jenkinson, crossing Russia from the White Sea, reached the Caspian, Persia, and even far away Bokhara. Ralph Fitch was England's pioneer to India. He crossed the peninsula, had an interview with the great Emperor Akbar, to whom Queen Elizabeth had sent a letter, and even visited Burma and Malacca. Nor should his fellow-traveller, John Newbery, be forgotten. He combined energy and courage with prudence, and was a splendid type of an Elizabethan Englishman.

The Queen's adventurous sea-captains and land-travellers form an unrivalled gallery of discoverers and explorers. But not less worthy to be remembered is the indefatigable recorder of their labours, Richard Hakluyt, the personal friend of most of them, the hearty well-wisher of all.

Elizabeth was the re-organizer of Westminster School, and she watched the progress of that "fruitful nursery" of great men with maternal care. Dean Goodman was her special choice. Camden, the most eminent topographer of her reign, was Head Master. When, in 1564, the Queen went to the Dean's house to see the Westminster boys act a Latin play, young Richard Hakluyt was one of those boys. The armour was lent by Secretary Cecil, the dresses came from the Revels; but this was years before there was any theatre or company of grown-up actors. Besides Latin plays performed before the Queen, young Hakluyt's great delight was the study of geography at his cousin's

rooms in the Middle Temple. He learnt things about geography which, he tells us, were of "high and rare delight to his young nature." Geography completely fascinated him while at Oxford, and he clearly saw the two great needs of his country. The first was caused by the ignorance of our seamen as regards the scientific branch of their profession. The second was the absence of records, and the way in which important voyages and travels were allowed to fall into oblivion. For



SIR MARTIN FROBISHER.
(From a wood engraving.)

instance, not a single line of writing by John Cabot had been preserved. Hakluyt set to work, on leaving Oxford, with patriotic zeal to remedy these evils.

He began by delivering lectures on the construction and use of globes, maps, and nautical instruments, "to the singular pleasure and general contentment of his auditory," he tells us. He strove to get a permanent lectureship established "as a means of breeding up skilful seamen and mariners in this realm." His first work, entitled 'Divers Voyages touching the discovery of America,' was published

in 1582. This book was the first impetus to colonization. But the great work of his life, the 'Principal Navigations,' did not appear in its completed form until 1600. It is a monument of useful labour. It not only gave a stimulus to colonial and maritime enterprise; it inspired our literature. Both Shakespeare and Milton owed much to Hakluyt's 'Principal Navigations.' Our Westminster boy, as the years rolled on, continued "to wade further and further in the sweet studie of geography" until he achieved his great work, which was, in his own words, "to incorporate into one body the torn and scattered limbs of our ancient and late navigations by sea." Hakluyt has ever since been a rich mine of information for all inquirers; and in a few years I hope that we shall have our old friend reprinted in a series of handy and portable octavo volumes, for everybody to read and enjoy.

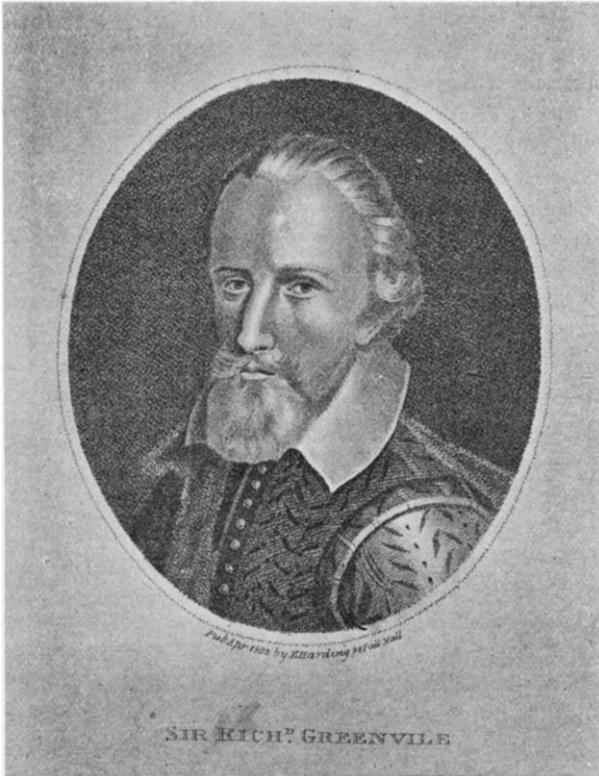
Hakluyt and Sir Walter Raleigh were the two principal promoters of the colonization of Virginia, therefore of the foundation of those colonies which eventually formed the United States of North America. For Virginia was then the whole of North America, except Florida and Norumbega; and Elizabeth, as we know from the title-page of Spenser's 'Faerie Queene,' included among her titles that of Queen of Virginia. Hakluyt, among his many and great services, led the merchant princes of that memorable reign to become the munificent patrons of maritime enterprise and of geographical research. Their names should ever be had in honour, and the chief among them should have a place in any commemoration of Elizabethan geography.

These Elizabethan merchants felt that they could not better serve their country than by despatching exploring expeditions and advancing geographical science. Sir Thomas Smith was one of the most eminent. He was an active member of the Muscovy Company, and was an adventurer for the first voyages to Spitsbergen. He took a leading part in the foundation of the East India Company, and was its first governor. He was ever mindful of Arctic discovery, and was the first governor of the North-West Company, gathering round him several other generous patrons of geography. His name was given by Baffin to Smith Sound, one portal to the polar ocean. But Sir Thomas Smith was not only an encourager of exploration; he also promoted the interests of the scientific branches of a seaman's profession, yielding to the persuasions of Hakluyt. Lectures on navigation were delivered at his house in Philpot Lane by Dr. Hood and by Edward Wright.

Other great patrons of geography were Sir George Barne, an adventurer of the Muscovy Company, who was at a meeting in Dr. Dee's house at Mortlake when John Davis's Arctic voyage was discussed, and whose descendant, Michael Barne, is now serving in the Antarctic Regions; and Sir Edward Osborne, the founder of the Levant Company and patron of the journeys to India, whose romantic story is so well known to us all. But there were many more, and the patriotic munifi-

cence of her merchant princes, in fitting out voyages of discovery, is one of the glories of Elizabeth's reign.

We must remember one other geographically minded merchant, Mr. William Sanderson of the Fishmongers' Company. He was the munificent patron of the Arctic voyages of John Davis, and all northern explorers who are fond of guillemot soup will remember him in connection with the great loomery on the perpendicular cliff which was



SIR RICHARD GRENVILLE.

(From a wood engraving by E. Harding.)

quaintly named by Davis, "Sanderson his hope of a North-West Passage."

Sanderson also paid for the construction of the famous Molyneux globes, one celestial, the other terrestrial, which are embellished with his coat-of-arms, and dedicated to the Queen. This is what he wrote upon them—

"Lo, at my charge thou seest the ever-whirling sphere,
The endless reaches of the land and sea in sight appeare,

For countries good, for worlde's behoof, for learnings furtherance,
Whereby our virtuous Englishmen their actions may advance,
To visit forraine lands where farthest coasts do lye,
I have these worldes thus formed, and to worldes good apply."

"And to worldes good apply." This is, I believe, the secret of England's greatness. Other peoples work for their own "countries' good." England alone has ever worked for "countries good" and for "worlde's behoof." The globes, which you will see in the next room, were finished in 1592. They created a great sensation among scientific men. Manuals for their use were published by Dr. Hood, and by Robert Hues in his 'Tractatus de Globis et eorum usu,' as well as by Blundeville in his Exercises. For it must be remembered that, before the use of logarithms, seamen were accustomed to work out their astronomical problems on globes—a most excellent method, in use, I believe, for instruction even now by our map curator, Mr. Reeves. It enables the mind of the student to conceive the great triangles in the celestial concave by which the problems of nautical astronomy are solved. John Davis said that "the use of the globe is of great ease, certainty, and pleasure—of all instruments it is the most rare and excellent."

This brings us to the Elizabethan maps, and first to that famous map of the world, which, in *Twelfth Night*, Shakespeare called—

"The new map with the augmentation of the Indies."

It is the first English map on the so-called Mercator's projection. But it is really Edward Wright's projection. The Cambridge student made a voyage with the Earl of Cumberland, and thus applied the test of practice to his theories. This led him to turn his attention to the improvement of charts then in use; and the map of Mercator first suggested to him the correction of the many and grave errors in charts by increasing the distance of parallels from the equator to the pole. "But," says Wright, "the way how it should be done I learnt neither of Mercator nor of any one else." In 1594 he discovered the true method of dividing the meridian, and his table of meridional parts was published by his friend Blundeville in the same year. His own work, entitled 'The Correction of certain errors in Navigation,' explained the principle of the division of meridians, the manner of constructing tables of meridional parts, and their use in navigation. Before Wright's calculation of the tables, Mercator's projection was practically useless. Afterwards it became most valuable, and was soon in general use. The first map on Wright's principle, like the Molyneux globes, attracted much attention. It was well covered with rhumb lines, and not very well engraved, for engraving was still in its infancy in this country. In Shakespeare's play of *Twelfth Night*, Maria says of Malvolio—

"He does smile his face into more lines than are in the new map with the augmentation of the Indies. You have not seen such a thing as 'tis."

There is also an allusion to the Dutch discoveries under Barents on the coast of Novaya Zemlya, which first appeared on Wright's map. Fabian says—

“ You are now sailed into the north of my Lady's opinion ; where you will hang like an icicle on a Dutchman's beard, unless you do redeem it by some laudable attempt, either of valour or policy.”

And this allusion to Barents is an occasion for recording the great interest taken by Queen Elizabeth in the progress of Arctic discovery.



SIR WILLIAM SANDERSON.
(From a wood engraving.)

She ordered Sir Francis Vere, her general in the Low Countries, to keep her informed on the subject as regards Dutch enterprises ; and the result of this order was a very fair account of the discoveries made by William Barents, from Sir Francis, in a letter to the Queen.

The Molyneux globes and the first chart on Mercator's projection were landmarks in the cartographic history of the Queen's reign, but they by no means stand alone. Very memorable is the survey

undertaken by Saxton, of England and Wales, under the auspices and protection of the Queen. It was the first field survey, the forerunner of the Ordnance Survey. The final result was the atlas, with a fine portrait of Queen Elizabeth on the frontispiece, beautiful copies of which will be seen in our collection. Saxton was followed by Speed the historian, whose atlas was based more or less on Saxton. The survey of Saxton is also the basis of Edward Sheldon's curious tapestry large-scale maps of the midland counties, woven by Flemish workmen brought over by Sheldon, and established at Barcheston. Two of these maps are at York, and two in the Bodleian. Their date is about 1588. It will be remembered that Mr. Bedford exhibited the York maps at one of our afternoon meetings in 1896.

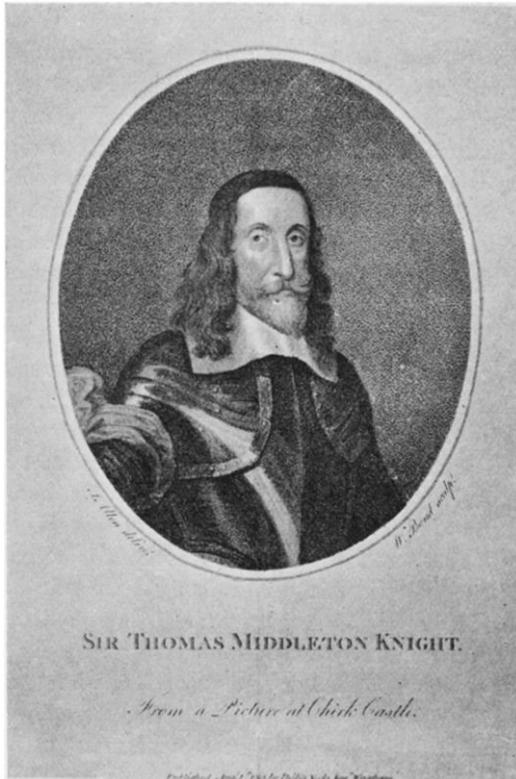
Charts for use on board ship, and particularly for expeditions of discovery, were specially drawn by hand by experts, and were on a large scale. Their provision depended on a knowledge of former work, and their construction required a good acquaintance with the principles of nautical astronomy, as then understood, and with the use of instruments.

The need had arisen for the best navigation books and improved instruments, both for the map-maker and the explorer. At first there were translations only. Ashley translated the 'Mariner's Mirror' from the *Spiegel* of Wagenaar; and the Spanish navigation books of Medina and Cortes were translated into English by Frampton and Eden. But soon our English scientific geographers began to produce original works. Cunningham's 'Cosmographical Glasse' appeared as early as 1559.

The value of the contents of English navigation books kept pace with the inventions connected with instruments for observing the heavenly bodies at sea. William Bourne, of Gravesend, in his 'Regiment of the Sea,' insists upon the duty of a captain of a ship to have knowledge, not only of charts, but also of instruments to take the height of the sun or stars. Nor were our Elizabethan sailors slow to seek instruction in the scientific branches of their profession. Bourne describes the use of the astrolabe and cross-staff; but his book, published in 1577, is chiefly interesting because it is the first in which the method of ascertaining the rate of a ship by means of the log and line is described. Humphrey Cole, the engraver and instrument maker, had, even at an earlier date, invented some plan for measuring the rate, analogous to Massey's self-registering log.

But the leading lights in Elizabethan nautical astronomy were Hues and Harriot, and somewhat later Briggs and Gunter; and it is worthy of note that most of them had their wits sharpened by long sea-voyages before they buckled down to their studies. Robert Hues had made a voyage to Virginia, and had knocked about with Cavendish in the Straits of Magellan, before he sat down to explain all the problems that

can be solved by the use of a globe. Thomas Hariot had made two voyages across the Atlantic to Virginia before he wrote his great work on algebra, and applied the telescope to observations of Jupiter's satellites, simultaneously with Galileo. Hariot, says Dr. Wallis, laid the foundation without which the whole superstructure of Descartes had never been. Edward Wright made a voyage against the Spaniards with the Earl of Cumberland before he calculated his table of meridional parts and constructed his famous map of the world.



SIR THOMAS MIDDLETON.

(From a steel engraving by W. Bond of a painting by J. Allen, at Chirk Castle.)

But perhaps Briggs and Gunter were the greatest of the Elizabethan scientific geographers. For the discovery of logarithms by Napier made a complete revolution in the science of navigation, and Briggs and Gunter brought the discovery into practical use. Briggs went through the gigantic labour of calculating his tables of logarithms of natural numbers. No greater service has ever been done by one man for navigation, and Luke Fox did well to immortalize it by naming an island in Hudson's Bay "Mr. Briggs his Mathematics."

Edward Gunter was a Westminster boy, like Richard Hakluyt, and was elected to Christ Church. He worked with Briggs at Gresham College, and while the former devoted his time to natural numbers, Gunter completed the tables of artificial sines and tangents. He invented and first used the terms cosine and cotangent. Gunter was also the inventor of the Gunter's scale, which we all know well, of the Gunter's chain, of a new quadrant, and of an improved cross-staff.

I have mentioned two Westminster boys, Hakluyt and Gunter. I must not forget Eton. Besides Sir Humphrey Gilbert, William Oughtred was an Eton boy. He was an eminent mathematician, and invented a very useful instrument called the "horological ring," two or three examples of which may be inspected in our exhibition.

It will thus be seen with what diligence and perseverance, with what zeal and enthusiasm, the men of science worked at the preparation of manuals, the construction of maps, and the improvement of instruments in order that the labours of their brethren in the field might be more useful, more accurate, and less perilous. Magnetic observations were also commenced in this reign; but there is a master of that subject present with us, who will presently contribute a short address to our commemoration.

At last, after near upon half a century, the memorable reign drew to a close. This evening, three centuries ago, the great Queen was speechless. Most of her early contemporaries had already passed away. Yet she was still surrounded by relations and affectionate friends. Her most trusted cousin, the great Admiral, was with her to the last. Beautiful Margaret Willoughby was one of the maids of honour to the Princess Elizabeth at Hatfield. Often she might have been seen in those days, in gay attire, in the balcony at Hatfield, talking and laughing with divers in the courtyard. Years rolled on, but her devotion to her beloved mistress did not diminish. As the widowed Lady Arundell, she attended her Queen and life-long friend on her death-bed.

And so, in the midst of her greatness, with many of those who had grown up during her reign still in full activity, full of patriotic schemes and scientific inventions, the great Queen passed away. But the work of her reign lived. The science of geography in England was planted on a firm basis, to grow and thrive. The impulse survived too, and the Elizabethans—the men born and bred in her reign—continued to produce valuable work, to perform great deeds, for twenty and more years at least after her death.

The roll of Elizabethan work, to quote myself in another place, "is indeed a roll of surpassing splendour. In the far north, the 'Meta Incognita' and Davis Strait discovered, and the intercourse with Russia by the White sea strengthened and organized. The Caspian Sea navigated and Bokhara visited. India and Burma made known. A great

fishing-trade established on the Newfoundland banks. Virginia discovered, and a sure foundation laid for the future colonies which were to form the United States. The charter granted to the Turkey Company, and British trade placed on a sure footing in the Levant. Lucrative trade on the coast of Guinea, in the West Indies, and on the Spanish main kept alive by English cruisers. The Orinoco explored as far as the mouth of the Karoni. The world twice circumnavigated. Cape Horn and 480 miles of the west coast of North America discovered.



SIR DUDLEY DIGGES.

(From a steel engraving by C. Turner.)

The Cape of Good Hope first rounded by English ships: and a charter of incorporation was granted to the East India Company, which opened the first chapter of the British Empire in India.

“One of the results of Elizabethan exploration and discovery was the extension of British commerce in all directions to the remotest corners of the Earth. Another result was to stimulate, in the highest degree, an enthusiastic feeling of patriotism which no difficulties or hardships could daunt, and no disaster could quench.” But for us

this memorable reign should ever be remembered as the time when geography, in all its branches, was fostered and advanced, and when our science had a commencement whence it has continued to grow and increase to the prosperous condition in which it came into our hands. But we must remember that much remains to be done. We can learn much—very much—from our Elizabethan predecessors; from those who penetrated into distant regions, as well as from those who devoted their talents at home to geographical research and to the improvement of geographical methods and appliances. From that point of view, it is well that we should, on such an occasion as the present, pass in review the geographical achievements of the subjects of the great Queen.

II. SIR WALTER RALEIGH.

By EDMUND GOSSE.

In the England which was controlled by that Virgin Queen whom we have met here to commemorate, there were two diametrically contrasted intellectual currents in active force. We are apt to forget the one, the prosaic and realistic tendency, which was represented in literature by domestic plays like those of Dekker, and by sober poetry like that of Daniel. It expressed itself in many practical forms of usefulness. It was so opposed to the picturesque that it averred there was nothing in the world more worth seeing than could be met with between Westminster and Staines. In public life this spirit found its perfect representative in Robert Cecil, that cold and crafty statesman who scorned and distrusted the exercise of the imagination wherever it confronted him. But at the side of this excess of common sense, and incessantly excited, and, as it were, burnished by resistance to it, there moved a class of mind which clothed the unknown in a robe of purple vapour, exalting, transfiguring, exaggerating all remote and unexperienced facts in a magnificent sunset light of glory. And the very prototype of this class of Elizabethan temperament was that paladin of geographical romance, Sir Walter Raleigh.

It is a remarkable tribute to the force and genius of Raleigh that he was recognized in his own age, and has been vaunted ever since as the patron as well as the prototype of geography as a form of imaginative literature. In the popular mind, to this day, he gets credit for what he planned and for what he wished to do, as well as for what he did. So pertinacious is the legend which connects him with Virginia, that I doubt if every one, even in this learned assembly, recollects that Raleigh never set foot in what we call North America. But in the events of 1583, in the epoch-making charter of 1584, in all that excited English sentiment in the settlement of those colonies from Martha's Vineyard to Florida, the moral influence of Raleigh was paramount. His nostrils