ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 28th May, 1866,

BY SIR RODERICK IMPEY MURCHISON, BART., K.C.B.,

PRESIDENT.

GENTLEMEN,

In this the twelfth Address which I have had the privilege of delivering to you, I have still the satisfaction of announcing that our Society is advancing in prosperity and flourishing with undiminished vigour. I have also once more to congratulate you on that which was a new feature last year — the issue of the annual volume of the Journal long before our Anniversary. This result is entirely due to the zeal and devotion of our Assistant-Secretary, Mr. H. W. Bates; and when you consider the additional labours he has to undergo in also editing the voluminous records of our Meetings and in conducting much ordinary business, you will unite with me in offering to him our hearty thanks.

If, during a large portion of the Session that has passed, we lost the services of our Senior Secretary, Mr. Clements Markham, it will be my pleasing duty, in another part of this Address, to call your attention to the highly important services he has rendered to his country during his recent journeys through various parts of British India. His place has, as you know, been well filled *ad interim* by Mr. Major, who, now that, to my great regret, we lose the services of Mr. L. Oliphant on account of his parliamentary duties, will, I trust, be elected by you to occupy the vacant place.

As at the last Anniversary, I will not attempt to treat of all the varied topics which have been under your consideration during the past Session, but will touch upon those subjects only which

have most interested me. These general observations, as on former occasions, will be preceded by a record of the lives of our deceased Fellows, as well as by a review of the Admiralty Surveys, as prepared by the Hydrographer, which important document necessarily takes a prominent place on such an occasion in this maritime country.

OBITUARY.

I naturally commence the record of our deceased Associates by a short notice, however imperfect, of the life of the illustrious English statesman, whose death on the 18th October last produced a thrill of sorrow throughout the nation.

As the leading events in the life of Lord PALMERSTON form a large portion of the history of this century it would be quite out of place were I now to attempt to enter upon so vast a theme. I will, therefore, simply advert to those features of his character which marked his acquirements and his love of science, as well as to those traits of goodness and heartiness which so endeared him to a large circle of friends and admirers.

In early life he was educated at Harrow School, and truly any of us who have seen him on the Speech days riding from London to his old school and back, when he was approaching his 80th year, may well say that he was a brave Harrow boy to the last.

In the next phase of his education I rejoice as a Scotsman to reflect upon the fact, that at the University of Edinburgh, and under the tuition of Dugald Stewart, Playfair, and other eminent men, the mind of young Henry Temple was stored with that solid and practical knowledge on which much of his future success depended. Next, at Cambridge he attached himself so earnestly to mathematical studies, that throughout life the solution of a problem was with him quite a natural process, which, in eliciting a new train of thought, relieved that official drudgery which he adopted as a fixed rule, and ever adhered to with unswerving perseverance.

I may, indeed, add, that when a new discovery in Chemistry or Physics was made, he always endeavoured to master the subject, showing, by his sagacious questions, how deeply he had reflected upon the information communicated to him orally by some scientific friend, when the pressure of public business prevented his reading the memoirs in which such discoveries were described.*

* This fact, particularly in relation to the great discovery of the spectrum analysis, and some of the recent researches of M. Foucault, was communicated to me by my friend Sir Henry Holland, the President of the Royal Institution.

In perusing the terse and well-reasoned despatches, or in listening to the speeches of Lord Palmerston, I always felt that it was to the scientific superstructure reared at Edinburgh and Cambridge upon the classical groundwork of Harrow, that this eminent man mainly owed his superiority over most of his contemporaries. Logic and method were always combined in him with ready wit and unfailing good humour.

His long administration of Foreign Affairs necessarily led him to take a deep interest in Geography, but particularly in the boundaries and territorial rights of nations, as secured by treaties or established by legitimate national exertions. Of all researches in distant parts, he was most attached to those made in Africa, inasmuch as throughout life he was forward, resolute, and unflinching in every measure which led to and carried out the abolition of the Slave-trade. Hence it was that the good Livingstone has told me, that he considered Lord Palmerston to be the most firm and genuine philanthropist he had ever known, and for that reason had dedicated to him his last work on Southern Africa. Whilst on this point let me say, that if Lord Palmerston were alive I feel certain that, with his anxious desire to ameliorate the condition of the negro races by introducing lawful commerce into their prolific country, teeming as it does, particularly on the West Coast, with produce of great value, he would have continued to sustain the recently-formed pioneer establishment on the Niger, which, under the direction of our lamented associate, Dr. Baikie (whose death I dwelt upon last year), has attained to so high a degree of prosperity. Recently, indeed, we have seen that able naval officer, Commodore Wilmot, who has so long commanded on the West African coast, lamenting bitterly over the suggested abandonment of all the advantages we had obtained, accompanied, as he states, by the prospect of returning to the former state of barbarous warfare among the native tribes, in lieu of a peaceable and profitable traffic by which they were rising in the scale of humanity.

From frequent personal intercourse with the late Premier, I can testify that he had the sincerest desire to advance every branch of science. Thus the acquirements of his youth enabled him to shine forth conspicuously in the year 1846, when he attended the meeting of the British Association at Southampton, over which I presided, and when he spoke eloquently and energetically in favour of that great institution in presence of the Prince Consort. Again, whether in granting to the Royal and other scientific Societies apartments in

Burlington House, including the very Hall in which I now address you, or in lending a willing ear to the claims of impoverished men of science and their families, he was ever our true and enlightened patron.

Let me add that Lord Palmerston was an assiduous and untiring man of business, to which, when Foreign Secretary, he devoted from eight to ten or even twelve hours a day. His constant practice, as one of his oldest associates has told me, was to sketch out a reply to every despatch of note as he read it; and in these sketches there was seldom any erasure or alteration. His style of writing was singularly direct, logical, and lucid, and his language the purest English. The handwriting was as muscular and bold as the matter was plain and intelligible. There was no mistaking either, though he thought and wrote with prodigious rapidity.

Lord Palmerston had a great facility for acquiring languages. At his own table you might hear him speaking to foreigners successively in French, Italian, and Spanish, with perfect fluency and a remarkably correct pronunciation.

When at Broadlands after a Parliamentary campaign he still stuck to official business with unflagging assiduity and tenacity, devoting to it hour after hour. In the afternoon, and when sporting friends were there, he would join in shooting, enlivening the party with many a good story. At other times he would ride a good distance to meet the foxhounds, and then follow them better and straighter than most of his younger associates. For, when in his saddle, Lord Palmerston was truly a premier among horsemen, his hand being as fine as his seat was firm. It was quite impossible for him to remain inactive, and when his public business was settled, and hunting or shooting were not the order of the day, he would row on the clear river Test, which flows by Broadlands, or look over his young racing stud, or take a long and fast ride on one of his high-bred roadsters. In the evening, when in the country, it was his habit to play a game or two of billiards, though he invariably returned to his official boxes for a revision of his papers before he retired to rest. With all his devotion to work, nobody enjoyed social intercourse more than Lord Palmerston; and those who have had the privilege of his acquaintance and have witnessed the joyousness communicated to the circle around him by his genial flow of conversation, aided as it was by the grace of the charming lady who so deeply mourns his loss, will unite with me in declaring that his residences in town and country were

centres of attraction, such as we cannot hope to see equalled in this generation.

Lastly, it is my pride to remind you, that during a long, eventful, and successful career, he ever adhered to and supported his friends of all classes with cordial sincerity; and it was this feature in his character, united as it was with undaunted public spirit and frank and open manners, that justly rendered Lord Palmerston so cherished a favourite of the British nation.

WHEWELL.—By the recent fatal accident which caused the death of Dr. William Whewell, the late Master of Trinity College, Cambridge, the world of science and letters has lost one of its brightest ornaments, while his large-heartedness endeared him to numerous friends, among whom I was proud to be numbered.

It is for others more competent than myself to dilate upon his almost universal acquirements; and, leaving it to the President of the Royal Society to notice his numerous contributions to physical science, I will treat only of the character of my lamented friend in some of those aspects of the philosopher with which I have been familiar.

Endowed with the most capacious grasp of intellect, it was the resolute will and energy of Whewell which, elaborating the advances made by numerous observers and philosophers past and present, gave him so strong a hold upon the minds of his cotemporaries. When the British Association was founded in 1831, it was through his suggestion to the Rev. W. Vernon Harcourt, the eminent lawgiver of that great Institution, that the system of publishing Annual Reports on the various branches of Science was adopted. At the first Cambridge meeting of that body (1833), when he was a Tutor of Trinity College, I can affirm that, to his unbounded zeal, untiring perseverance, and methodical arrangements, the success of the meeting was as much due, as it was to the eloquence and popularity of his senior, Professor Sedgwick. It was then, indeed, quite apparent that, if Whewell should live, a quarter of a century would not pass over without producing rich and fruitful results. The versatility of the genius of the man has been demonstrated not merely in his various publications, but also in the offices which he successively held; for, capable as he was of unfolding and explaining the most elaborate arguments of the metaphysician as Professor of Casuistry, we next find him lecturing on Mineralogy, and bringing all his mathematical knowledge to bear upon Crystallography.

It was the high position which he took up as a mineralogist which induced the Geologists to place him at their head; and, after presiding over the Geological Society of London during two years, he left behind him in his Addresses a series of broad views which connect Geology in a masterly manner with many other branches of Natural History; whilst his masculine eloquence had the happiest effect in marking out for his associates the future bearing of their researches. In truth, he was so rich in accomplishments that he was well qualified to preside over any scientific Society. Nay, more, we may well extend the capacities he possessed to art—at least to antiquities and architecture, for in these departments he was equally an adept.

In addition to his sterling knowledge in science as well as classical lore, Whewell had a warm poetical verve, as proved by his composition of a collection of English hexameter verses. He further possessed great facility with his pencil, in delineating, not only the forms of architecture, but also the features of a landscape. In the last-mentioned accomplishment I shall ever remember the rapid but truthful sketch which, in a few minutes, he made in my presence of the Wren's Nest near Dudley,—a sketch which I published in the 'Silurian System.'*

Amid his almost countless employments, those persons only who have closely watched his career are aware that, in the years 1826 and 1828, while occupied with Professor Airy in ascertaining the density of the earth by observations carried on in the deepest mines of Cornwall, "he lived (as he tells us himself) for four months the life of a labouring miner." †

Among his numerous qualifications it is now, however, my special duty to affirm that our deceased associate was a sound Geographer. His strong point, indeed, was the world known to the ancients, but he also took the most intense interest in every new discovery in remote regions, and in every addition to our knowledge made by distant travellers.

Again, he continually endeavoured to aid the advance of our science by contributions of a high intellectual cast, as proved by his remarkable memoir on the Tides, published in the 'Philosophical Transactions.' Although not a contributor by name to our volumes, it is further my duty to honour his memory by stating

* See p. 485, also 'Siluria,' p. 131.

† See the end of his address as President of the British Association at the Plymouth Meeting, Report of 1841.

that several passages in my own works relating to the power of waves of translation and currents, are from the pen of this untiring writer, who not only found time to produce works of sound classification, and to direct the affairs and government of a great College, but also to assist any friend who he saw was struggling to enunciate important physical truths, of which the writer felt the value, but could not express them with the lucidity and power of a Whewell.

Recurring to the Addresses which he delivered to the Geological Society, we find in them the same clear definitions of the branches of that science as those which he affixed to other divisions of the sciences. His separation, for example, of all geological works into great classes, "Descriptive" and "Dynamical," and his vivid perception of the imperishable truths which were being chronicled in the first-mentioned of these classes, afforded, as I can testify, great comfort to those of us who were then gathering together positive data, which we hoped might be hereafter regarded as established landmarks. On the other hand, when he dwelt upon what he termed "Geological Dynamics," his writings show that he clearly saw what a struggle would ensue, and how long it would continue, between speculators who compared the grand ancient revolutions of the surface of the globe with the changes of which history affords us any examples. It was he, indeed, who first proposed the names which have since been affixed to the two great classes of geologists, "Catastrophists" and "Uniformitarians." In reference to these names I may state from my own knowledge that Whewell agreed with Buckland, Sedgwick, Von Buch, Humboldt, myself, and many others, that the vast oscillations which took place between land and water in very remote periods, as well as the abrupt dislocations, and often inversions on a vast scale, of the strata composing mountain masses, were only to be explained by operations of far greater intensity than those of which mankind have ever had any examples, and at the same time that many of these are phenomena wholly inexplicable by any amount of draft upon time.

But, as I am addressing Geographers, I must now offer an explanation, which would not be required were this Address delivered to my brother Geologists. In speaking of Uniformitarians, as Whewell defined those geologists to be, whose leader is my eminent friend Lyell, the worthy inheritor of the mantle of Hutton and Playfair, let it not be supposed that any reasonable geologist, certainly not myself, who may dwell upon the great and sudden dislocations which he believes the crust of the earth underwent from time to time in

far bygone periods, is not also a strenuous advocate of an uniformity of causation as respects the enormously long and undisturbed periods required to account for the accumulation of the thick sedimentary deposits. On the other hand, unbiased Uniformitarians now admit of occasional catastrophic action; and, as the question is thus reduced to be one of degree only—that degree to be fairly gauged by measuring the relations and extent of the ruptures of the crust of the earth—I feel confident that out of fair discussion the exact truth will ultimately be obtained.

In the last of his Geological Addresses, Dr. Whewell told his auditors, that he considered the great theorizers of the past as belonging to the fabulous period, whilst he flattered the hard-working field geologists of our day by saying, that "the men who were around him belonged to the heroic age of geology, and that it was the destiny of the science to pass therefrom to the historical period." Now, after a lapse of twenty years since these words were spoken, this is just the transition which is now taking place. We may therefore treasure up this saying of a man whose occupations through life had been to trace the principles and laws by which the progress of human knowledge is regulated from age to age in each of its provinces, and to estimate its future advance.

When, indeed, those who were intimate with Dr. Whewell look back to the state of the University of Cambridge when he was in his fullest vigour, and had for his contemporaries a Sedgwick, a Herschel, a Peacock, an Airy, a Henslow, and a Hopkins, we may well talk of that as the heroic age of science, since we can scarcely expect to see again, at any one time, so many great minds rivalling each other as were then the teachers of British youth in the famous University of Newton.

In his exhaustive essay on the 'Principles of English University Education,'* it is refreshing to find how successfully Whewell maintains the necessity of instructing the youth as equally and essentially in classical knowledge as in mathematics, the physical sciences, and modern languages; and, referring back to the earliest standard examples of poetry, eloquence, history, criticism, grammar, and etymology, he thus writes:—"All the civilized world has been one intellectual nation, and it is this which has made it so great and so prosperous a nation. All the countries of lettered Europe have been one body, because the same nutriment, the literature of

* Parker, Strand, 1837.

the ancient world, was conveyed to all by the organization of their institutions of education."* And this is said by the mathematician who by some was considered to be too exclusive a favourer of those scientific studies which have elicited the noblest results of modern intellect!

No one, indeed, can read the peroration of this remarkable essay without being warmed by the generous enthusiasm of the man who, in sustaining the true value of English University Education, looked to its right administration as "involving the welfare of countless generations of Englishmen yet unborn, and of centuries of English civilization yet only in the germ."

Proud of the great College in which he had been reared, and of which he was so many years the Master, it is pleasing to record that Whewell applied during his life large sums of money to the erection of new halls, whilst, in addition to many acts of munificence, his death was marked by a kindly consideration of his successor (whoever he might be) in the Mastership, and to whom he bequeathed the chief contents in the interior of Trinity Lodge. Let me here add, that if his manners were occasionally abrupt, there never was a more kindhearted being; and it was this inbred quality which so endeared him to all his old friends.

Having heard it said that, great as was the Master of Trinity, he lacked inventive genius, I cannot close this brief and imperfect record of his merits without offering a set-off to this criticism. For, though the name of Whewell is not enrolled among those who have had the good fortune to be illustrated by great discoveries in science, he has done that for scientific research which leads many into the paths of discovery. Like the illustrious Bacon, the first great teacher of inductive philosophy, and with a similar comprehensive survey of the intellectual world, he has pointed out at once the direction in which science has hitherto moved, as well as that which is hereafter to be the line of its advance, and thus has reared for himself a solid memorial of his eminence.

Admiral WILLIAM HENRY SMYTH, C.B., who was taken from us in September last, at the age of seventy-seven, was distinguished as an astronomer and an antiquary, as well as a geographer,—acquirements rarely united in the person of one who in his early career had been so conspicuous for his gallantry in the naval service of his country. A record of those public services is given in the Anniversary Report

* 'English University Education,' p. 35.

of the Royal Astronomical Society. The important point on which I have first to comment is, that during the war which ended in 1815, he was signalised not only by various acts of devotion and courage, but also by carrying on, when only a Lieutenant in the Royal Navy, an extensive series of hydrographical observations between Sicily and the coasts of Italy and Africa. For this service he was promoted to the rank of Commander. Whilst his full and striking description of Sicily and the adjacent islands was published in 1824, he was actively engaged in completing his hydrographical surveys in the Mediterranean, in which he was continuously occupied during ten years, displaying so much ability and accuracy that he fairly won for himself the name of "Mediterranean Smyth." It was during these surveys that he collected antiquarian relics from the ruins of Lepti Magna, in Barbary; and it was also in these years that he matured that love for astronomical observation which clung to him through life, the most striking proof of which was the establishment, at his own cost, of an observatory at Bedford. Those persons who, like myself, visited him when he had just completed that building, have a lively recollection of the zeal with which he was supported in carrying out his views by that highly accomplished lady his wife.

His equatorial refractor being one of the first constructed in this country, and which had attached to it all the improved apparatus and adjustments of that day, he was enabled by it to make a series of observations of the highest value; and continuing those after his instruments had been transferred to Hartwell, the residence of Dr. Lee, he published his 'Cycle of Celestial Objects' in 1844, including his Bedford Catalogue; and for this work he was rewarded with the gold medal of the Astronomical Society. After that period, we learn from the truthful sketch of his life by Mr. Isaac Fletcher, F.R.S., that he continued his astronomical labours with untiring zeal to near the close of his valuable life. That friend and brother astronomer, supported in his opinion by such authorities as Herschel and Airy, has well said of Admiral Smyth, that as a geographer, a hydrographer, a numismatist, and an antiquary, he was equally distinguished as in astronomy, by the depth of his inquiry, his untiring industry, and the sagacity of his deductions.

It is, however, in this hall that I claim to speak specially of our departed associate as a geographer who was thoroughly entitled to preside over us, whilst it is peculiarly gratifying to me to remind you, that to no one of our leaders do we owe a

truer debt of gratitude than to Admiral Smyth. Though he was not the actual founder of our Society, as explained in my address of last year,* it is certain that in the very year of our origin Admiral Smyth sketched out the project of a Geographical Society, and had absolutely enrolled many good men in furtherance of it. To the conduct which he pursued during his presidency, in the years 1849-50, I hesitate not to repeat, what I expressed when I succeeded him, is due the first step in advance which led to our present prosperous condition. Such was the energy and ability with which he brought our geographical ship into trim, that when he handed her over to me I had little more to do than to let her run before the favouring breeze which my gallant friend had taken advantage of, and by which he had steered us, with such ability and tact, towards a safe haven.

Among the numerous good services which he willingly rendered to me in the performance of my duties, it gave me pleasure to state that the feeling notice of the life and death of his brother officer, the late Duke of Northumberland, as published in my last Anniversary Address, was from his pen, and it evidently came from the heart of the man whose loss we now mourn.

It was impossible to know Admiral Smyth, and to mark the zeal and fidelity with which he carried out every object at which he aimed, without feeling that he was one of the finest types of the old British seaman. The celebrated Captain John Smith, who was termed "the saviour of Virginia," the grandfather of our deceased associate, lost all the fortunes of the family by his adherence to the Royal cause in North America; and this is just what our lamented Admiral would have done if placed in a like position, so truly loyal was he in heart and conduct.

Beloved by a very numerous circle of friends, and respected in every scientific and literary Society to which he belonged, Admiral Smyth has bequeathed a spotless and honoured name to his sons, one of whom is now worthily the President of the Geological Society, and another the Royal Astronomer in Scotland; whilst his devoted widow can reflect with just pride on those astronomical achievements of her gifted and excellent husband in which she bore no inconspicuous a part.

Sir William Jackson HOOKER, K.H.—This eminent botanist, who for more than half a century had occupied a prominent place in

* See Journal R.G.S., vol. 35, p. cxxxvii. note.

science, and who throughout his long career laboured incessantly for its furtherance, died at Kew on the 13th August last, in his eighty-first year. Sir W. Hooker's whole heart was given to the advancement of Botany, but in promoting its progress he also rendered many important services to Geography. As the Presidents of other scientific Societies, particularly the Linnean, will doubtless place on record his many claims to a high rank among botanists, it would be out of place on my part to enumerate the long series of his works which have borne testimony to the wide range of his knowledge, the ready skill of his pencil, the energy of his character, and to the perseverance with which he worked on till the very end of his meritorious life. It must be my object to glance at his career chiefly as it bore upon our own science, and to note what Geography has gained by his labours.

Descended from a family already boasting of more than one illustrious name, W. J. Hooker was born at Norwich on the 6th of July, 1785. Succeeding, as soon as he came of age, to a competency left him by his godfather, he was able to gratify his taste for travelling and science without the necessity of adopting a profession. Having in his youth enjoyed the friendship of three very eminent zoologists, Kirby, Spence, and Macleay, his first choice was Entomology and Ornithology, on the study of which he entered with all the enthusiasm of his character. Fortunately for Botany, Sir J. E. Smith, the then President of the Linnean Society, was also a Norwich man. With him Hooker was brought into intimate communication by the fortunate accident of his discovery for the first time in Britain of a peculiar moss, the *Buxbaumia aphylla*. Smith introduced him to Dawson Turner, of Yarmouth, an eminent cryptogamist, whose daughter he afterwards married. The love of Botany, thus accidentally developed, grew rapidly under the fostering care of these eminent men, and under the fascinating influence of that precious Linnean Herbarium, of which Sir James Smith was the fortunate possessor. Thenceforward devoting himself entirely to Botany, Hooker soon set before himself as his main object the formation of a herbarium—an ambition which, as is well known, he ultimately realised with a completeness of success far exceeding anything he could have thought possible at the beginning of his career.

To extend the Herbarium, his lengthened tours in Scotland in 1807 and 1808, extending to the Orkneys and Hebrides, were followed by a voyage to Iceland, made at the suggestion of Sir Joseph Banks, himself an Icelandic traveller. Unfortunately for science

Mr. Hooker lost all his collections and most of his notes through the destruction by fire of the vessel in which he was returning—a calamity from which he only escaped with life by the fortunate presence of another vessel close at hand. His 'Recollections of a tour in Iceland,' published at Yarmouth, though prepared, as the title declares, mainly from memory, may even now be consulted with advantage for the narrative, as well as for much careful research.

Having thus personally explored Scotland and Iceland, he was next led to take a special interest in the Arctic and Scandinavian flora; for just at that time the first of the many explorations by land and sea in search of the North-West Passage was made. He thus became the intimate friend of Parry, Franklin, Richardson, Beechey, and James Ross, all of whom entrusted to him for publication their botanical treasures brought from those icy regions.

In 1814 the opening of the Continent enabled Hooker to make an extended tour through France, Switzerland, and Northern Italy; and in 1820 he went to Glasgow as Professor of Botany, where he remained for twenty years. During that period he was an admirable teacher, exciting in his pupils the highest enthusiasm by the animating style and clearness of his lectures, and still more by the annual excursions to the Highlands, in the course of which he never failed to convey to those who accompanied him a portion of his own love of Nature and her works. Glasgow was then, as it is now, an important medical school, and the number of graduates very large; all were required to attend a course of Botany, and many studying with great zeal, acquired among other things a love of exploration. Numbers entered the army, navy, and Indian medical service, or sought other positions in foreign countries. To all of these Sir William Hooker was ready to lend a helping hand, guiding their studies while pupils, and furthering their interests afterwards, well satisfied to be repaid by a share of their collections, the labour of publication often devolving upon him. Although in all this his first object was Botany, yet that science being intimately related to Geography, the furtherance of the one science led necessarily to the advancement of the other, and thus zealous botanists of his own training were successively spread almost broadcast over the face of the globe. Besides Dr. Clarke Abel, who at his recommendation became the naturalist to Lord Amherst's embassy to China, I may name, amongst his other pupils who rendered good service to Geography, Gardner, the Brazilian traveller, Scoules, who explored

North-West America, as well as Douglas and Drummond, both naturalists attached to Arctic expeditions. Above all, let me name our medallist of this year, Dr. Thomas Thomson, the explorer of the Western Himalayas, and Dr. Joseph Hooker, the son of my deceased friend, so well known as an antarctic voyager and for his admirable work on the Eastern Himalayas, and who has worthily succeeded his excellent father as Director of the Royal Gardens of Kew.

Nor was Sir William Hooker's foreign correspondence confined to his former pupils. Indefatigable as a letter writer, and strictly punctual in reply, he attended to all who applied to him for information, and thus knew everything which was done in his favourite science all over the world. He was, therefore, from an early period referred to by those who had scientific appointments in their gift, and indeed even when not referred to was wont, as I can testify, to watch every proposed geographical expedition and to urge upon the authorities the importance of attaching to it a naturalist. In his great knowledge of the vegetable productions of our colonies originated the happy idea of that great work, the 'Colonial Floras,' the first part of which was his own 'Flora Boreali-Americana.' Other parts, such as those of Ceylon and Hong Kong, are finished, and those of the Cape of Good Hope and Australia are now in progress, and the whole, it may be hoped, will be completed before many years elapse. Though none of these, except the first part, were his own work, he looked on them all with parental interest, for they originated in his own suggestion and were sanctioned by the Crown on his urgent representation of their importance.

It was in 1840 that Sir William Hooker left Glasgow for Kew, where for a quarter of a century he laboured most successfully in the development of the Royal Gardens, without allowing his other labours in the least to flag. What these gardens now are we all know; but to appreciate fully his merits we must recollect, as I well do, what they were when he took charge of them. We may, indeed, truly say that no more enduring memorials of his life could be desired than these noble grounds, that magnificent winter garden, though still unfinished, and the splendid museums, full of vegetable treasures from all parts of the world.

Universally beloved at home, Sir William Hooker was also honoured and esteemed in many foreign Societies in which science is cultivated, and they rejoiced to bestow on him their honorary distinctions. As Director of the Royal Gardens at Kew, he was of

pre-eminent service to Botany through the independent action which, much to the honour of our Government, he was allowed to exercise in the management of that great and attractive national establishment. Supported by adequate grants of the public money, he invariably used them with solid judgment and good taste; thus demonstrating by the works he has left behind him, that the best, if not the only true method of advancing any branch of science, is to entrust its management to a well-skilled responsible chief, and not to embarrass and dwarf it by affiliation with other and alien divisions of the public service, of which, owing to a habit of bureaucratic organisation of our so-called "Departments," there are in this country some striking examples.

Without enumerating his numerous foreign titles, I may state that, in addition to a knighthood of the Guelphic order, conferred on him by William IV., Sir William was a Fellow of the Royal, Linnean and Royal Geographical Societies, and was most worthily honoured by the University of Oxford with the distinction of Doctor of Civil Laws.

Sir John RICHARDSON, C.B.—The Society has lost another of those eminent men who have distinguished themselves in Arctic discovery. John Richardson, the intrepid companion of Franklin, was born at Dumfries in the year 1787, and educated at the grammar school there until he reached the age of fourteen, when he was transferred to the University of Edinburgh. Entering the Royal Navy as assistant-surgeon in 1807, his first service was in the *Nymph*, which vessel accompanied Lord Gambier's fleet to Copenhagen; and he was in the boats of that ship when they attempted to cut out a French brig, under Belem Castle, in 1808, in which affair Captain Shirley was killed. In consequence of his conduct on this occasion he was made surgeon, and appointed to the *Hercules* of seventy-four guns. In 1809 he was transferred to the *Bombay*, and served in that ship at the siege of Tarragona: afterwards as surgeon to the 1st battalion of Marines he was with Sir G. Cockburn in the operations on the coast of Georgia, and was present at the capture of a fort and the taking of the town of St. Mary's.

In May, 1819, he was selected to accompany the Polar land expedition under Sir J. Franklin. After venturing on the great Slave Lake, the Coppermine River was descended in frail birch-bark canoes, and the coast of North America explored to the eastward $6\frac{1}{2}°$, as far as Cape Turnagain. The record of hardship and privation experienced upon their return voyage will be familiar to most of you,

and nobly did Richardson play his part on this trying occasion. In the introduction, indeed, to the account of the voyage, Franklin pays this tribute to his assistance. "To Dr. Richardson the exclusive merit is due of whatever collections and observations have been made in the department of Natural History, and I am indebted to him in no small degree for his friendly advice and assistance in the preparation of the present narrative."*

In the second expedition of Franklin, 1825 to 1828, to Dr. Richardson was entrusted the exploration of that portion of the Arctic Sea between the Mackenzie and the Coppermine rivers, a distance of 902 miles, while Franklin proceeded along the coast to the westward, and reached a spot within 160 miles of Icy Cape (the limit of Captain Cook's discovery). The geographical results of these two expeditions may be thus summed up:—The exploration and delineation of the northern shore of the American continent throughout 40 degrees of longitude, comprising an extent of coast-line amounting to nearly 2000 miles. But it was not geography alone that was benefited by their labours, for the meteorological and magnetical observations, taken with a faithfulness and perseverance that demands the greatest praise, combined with those collections in the department of Natural History, which, while taking a share in the labour of his companions, were the especial vocation of Richardson, rendered the account of these voyages especially interesting to the scientific world; and the publication of that excellent work, the 'Fauna Boreali-Americana,' proved how well qualified he was for the position he had been selected to fill. In 1838 Dr. Richardson was appointed Physician, and in 1840 Inspector of Haslar Hospital; in consideration of his eminent services, he was made a Companion of the Bath, and received the honour of Knighthood in 1846.

When in 1848 it became necessary that succour should be sent to his former chief, Sir John Franklin, Richardson again came forward, not only with his valuable advice and experience, but with personal service; and in company with Dr. Rae descended the Mackenzie, and traversed the Arctic shore between that river and the Coppermine, an account of which was published in 2 vols. in 1851. His assistance to the subsequent searching expeditions by the preparation of pemmican and antiscorbutics, and the advice respecting clothing and equipment, were undoubtedly of great service, and possibly the means of saving many lives.

* See Franklin's 'First North-Polar Expedition.'

After his retirement from active service Sir John settled at Grassmere, and, as will be seen in the list of his works in the foot-note,* took a prominent part in the promotion of science; and after an honourable and useful career, terminated an active life of industry on the 5th of June, in the 78th year of his age, and to the deep regret of his numerous associates in the Royal, Linnean and Geographical Societies, in all of which he was most highly esteemed.

Finally, let me say of my valued friend that all his scientific work bears the impress of his character. It is painstaking, honest, sagacious, and without pretension; a most trustworthy repertory of carefully and intelligently observed facts.

In his official relations, Richardson presented to superiors as to inferiors the same simple dignity, inflexible determination to do what he considered right, and great administrative energy in carrying out that determination. A certain, not inappropriate, Arctic ruggedness coated the exterior of the man, and perhaps interfered with his reaching the highest post which he was eminently qualified to occupy, as occasionally it may have led young and inexperienced juniors to think him cold and unsympathetic. But sooner or later his subordinates found that Sir John had silently taken the measure of their tastes and capacities, and, when an opportunity presented itself, was ready to advance their interest in a spirit of most genial and thoughtful kindness. One eminent naturalist† has told me, that he owed what he has to show in the way of scientific work or repute to the start in life thus given him by Sir John Richardson. In short, by an union of sagacity and energy with a warm heart, he was a fine type, I am proud to say it, of the foremost class of Scotsmen.

Dr. BARTH.—By the death of Dr. Henry Barth, the great African traveller, we have lost a distinguished medallist of this Society, and a geographical explorer of world-wide fame. Born at Hamburgh in 1821, he died at Berlin in 1865, in his forty-fourth year. Those who wish to trace the detailed progress of this remarkable man

* *List of Works by Sir J. Richardson.*—Fauna Boreali-Americana, 2 vols. folio, 1829 to 1836. Report on North American Zoology, 8vo., 1837. On the Frozen Soil of North America, 8vo., 1841. Zoology of the 'Sulphur's' Voyage (Fish), 1843. Zoology of the 'Samarang's' Voyage (Fish), 1848. Boat Voyage through Rupert's Land and the Arctic Sea, 2 vols. 8vo., 1851. Zoology of the Voyage of the 'Herald' (Fossil Mammals), 1852. Notes on Natural History (Belcher's last of the Arctic Voyages), 1855. Hygiene as a branch of Military Education (in the Transactions of the Social Science Association), 1858. Yarrell's History of British Fishes (new edition), 1859. Polar Regions (in the Encyclopædia Britannica), 1859. Polar Regions, 1861. Museum of Natural History (Glasgow), in connexion with others, 1859 to 1862.

† Professor Huxley.

should peruse the account of his life, as given by Dr. Koner of Berlin. Educated thoroughly in a knowledge of the classical authors of antiquity, he from an early age began to take the deepest interest in African geography, when he read with keen relish the works of our countrymen Mungo Park, Lander, and others. After acquiring the degree of Doctor in the University of Berlin, he made, in the years 1845 to 1847, coast journeys along the southern or African shores of the Mediterranean, a full account of which was afterwards published at Berlin (1849). In 1853 he communicated to our Society an account of his more extensive expeditions; and in 1857, when a resident in London, he completed that masterpiece of all his labours, entitled 'Travels in North and Central Africa,' in 5 vols., being the result of all the researches he had made, when associated with Richardson, with Overweg, with Vogel, and lastly by himself alone and undaunted.

It was for this original work that the Royal Geographical Society awarded to Dr. Barth its highest honour, and placed him in the limited list of its Foreign Associates; for although he made no observations to fix with astronomical accuracy the latitude and longitude of places, the reckoning of the distances he travelled over was so accurately and minutely laid down, and his chronometer so studiously observed, that he was enabled to add much to cartography, whilst his description of the countries he traversed, and the inhabitants he came in contact with, was most telling and effective.

Since that time, following the steps of his eminent countryman, Carl Ritter, Dr. Barth has been the life and soul of the Geographical Society of Berlin, by bringing before that body the accounts of the travels of all African explorers, including Du Chaillu, Speke and Grant, Munzinger, Beurmann, Baikie, Vogel, Duveyrier, Schweinfurth, von der Decken, Gérhard Rohlfs, and others. He also made two journeys in the interior of Turkey, accounts of which are given in the 'Zeitschrift fur allgemeine Erdkunde' of 1863, in which work, as in the 'Mittheilungen' of Petermann, and in the volumes of the German Oriental Society, will be found a list of his numerous publications.

The chief work by which Dr. Henry Barth will be remembered is that to which I have already alluded, and which he published under the auspices and by the assistance of the British Government. In it he developes how, by his indomitable perseverance and skilful researches, he was enabled, for the first time, to lay before the world the true character of a vast extent of wide and hitherto untrodden

lands between Timbuctoo and the Niger. It was specially for these labours that we rejoiced to honour him by giving him our medal; and we were equally rejoiced when our gracious Sovereign conferred on him a Companionship of the Bath.* A more intelligent, indefatigable, trustworthy, and resolute traveller than Dr. Barth can rarely be found, and we all deplore his untimely end at the early age of forty-four.

FORCHHAMMER.—John George Forchhammer, who died at Copenhagen on the 14th December last in his 73rd year, was a justly popular and highly esteemed Foreign Member of our body, as well as of the Royal and Geological Societies of London. The son of the Rector of the school at Husun, in Jutland, he studied chemistry and pharmacy at Kiel, under Phaff, afterwards made an excursion to the Harz to see the small smelting-furnaces of Goslar, and subsequently, at the University of Copenhagen, he largely profited by the lectures on physics of the illustrious Oërsted. In 1820 he became a Doctor of Philosophy; his inaugural treatise being on the acid and superacid of manganese. Lecturing continuously, whether on the manufacture of porcelain, or on chemistry and mineralogy, he became, on the death of Oërsted, Director of the Polytechnic Institution and Secretary of the Royal Academy of Sciences.

The enumeration of all the original publications of Forchhammer, the greater number of them pertaining to chemistry, mineralogy, and geology, is not consistent with the nature of this Address; but in order to do full justice to the memory of my valued friend, I have handed over to the President of the Royal and Geological Societies an admirable notice of his deeds and accomplishments, prepared at my request by his distinguished countryman, Admiral Irminger, of whose fellowship we are all so proud. Suffice it to say, on this occasion, that Forchhammer's analyses of many simple minerals, as well as of magnetic iron, his treatise on the elements of sea-water, and their distribution in the ocean, the result of 180 analyses, are works of a very high scientific order. The last of these was undertaken to establish the view he embraced, that "sea-water is the result of the reciprocal agency between the washing

* As one of his German biographers implied that Dr. Barth was not adequately honoured in this country, let me remind his countrymen that he received at the hands of the British Government an honour of the Crown which was not obtained for Speke and Grant, although the utmost exertions were made by myself as President of the Royal Geographical Society, as well as by many influential persons, to procure for them also that distinction.

out of different substances from the earth, and their chemical, physical and organic agencies."

Forchhammer first visited England in 1820, and examined our sedimentary formations, then very imperfectly classified, particularly as regarded all the older rocks. In subsequent years he wrote memoirs on the geological structure of his own country, and, what is well worthy of notice, he explained the outlines of the lands of Denmark, by showing to what extent they were due to geological structure and ancient movements, and how far they had been modified since the earliest traceable historical period. His memoir on the influence of sea-plants in the production of alum shale was a first step in a series of publications in which he demonstrated how in the present time, as in former periods, different substances after certain changes revert to their original form and condition. Indeed, several of his other works have the same bearing, viz., "On the minerals in animals and plants of the ocean;" "On the spread of mineral matter through the strata of the earth's crust;" "On the origin of Dolomite;" "On the artificial production of crystals of apatite and magnetic iron," &c. Besides these purely scientific works, he was of great use to his country by showing the relative value of peat and other combustibles, and by establishing good supplies of water by means of Artesian wells.

Making several journeys to England, he travelled in one of them (1837) with Professor Phillips, the present President of the British Association, and as I then made his acquaintance, it afterwards became a source of great gratification, as well as instruction to myself, to cultivate his society whenever I passed through Copenhagen in my visits to Russia between 1841 and 1845 inclusive. It was in his native capital that Forchhammer shone out conspicuously, not only through the high station he had there attained as a man of science, but also by his powerful social influence. Indeed, from the King downwards he was esteemed—nay beloved by every one, and he invariably used his influence to the best possible effect.

Being associated with him in 1844 as member of a great scientific Scandinavian meeting at Christiana, it was my good fortune to make geological excursions with him in Norway; and on these occasions I was forcibly struck with his ability and quickness in accounting for the metamorphism of several members of the Silurian deposits in those tracts where they are in contact with the igneous rocks, which

have changed fossiliferous limestones into white saccharoid marble, sandstone into quartz rock, and shale into crystalline slate. In 1845 he was very servicable to me in explaining the exact relations of several of the Silurian rocks of the south of Sweden (Scania, &c.), which I had just visited. Among many other original views, he called my attention to the proofs in the physical configuration of the coasts of a long line of former subsidence, which passing from Denmark in the north, deepened in its range southwards, if it did not actually form the Straits of Dover. He contended that in all the submarine forests along these shores, the trees which still stood erect, with their roots in their native soil, had nearly all been truncated about two or three feet above their stools—a result, as he justly said, which could not have happened if a gradual subsidence of an inch or two in a century had taken place, as in such case the wood must have certainly rotted and disappeared.

In alluding to my intimate relations with Forchhammer, I must pointedly advert to the cordial and encouraging support which he gave me, in company with his eminent countryman Oërsted, when I presided over the British Association at Southampton, in 1846; neither can I forget how he gratified me by his presence when I lectured in 1849, during the meeting of the British Association at Birmingham, to a vast multitude in the caverns of Dudley.

In summing up his character I must say that I never met with a man who was more truly good and loveable. His bodily powers, as exhibited during a pedestrian excursion, were extraordinary; and he ever enlivened the way with so many illustrations or merry anecdotes that no symptom of fatigue could arise in his company. As a lecturer, he was lucid and persuasive, and ever carried his audience with him.

Honoured by his sovereign, beloved by his countrymen, and occupying the highest position to which a man of science can attain, the body of this eminent and loyal Dane was followed to the grave by persons of every class, all of whom felt that among them no one had been more broken-hearted at the spoliation of Denmark, and the invasion of his native Jutland, than the high-minded and patriotic John George Forchhammer.

NILS NORDENSKIOLD.—This skilful mineralogist and geologist and close observer of the outlines of the earth, who, on my own motion, was not long ago added to the list of our Honorary Corresponding Members, died on the 21st of February last, near

Helsingfors, in Finland; being then in his seventy-third year. It was especially for his new map of Finland, illustrating his able memoir on the scratched and polished surfaces of the rocks of his native country, that we considered him to be well worthy of the honour we conferred on him. No work, in my opinion, has more thoroughly demonstrated the truth of the conclusion at which I had arrived, and on which I dwelt at some length in my Address of 1864, namely, that during the glacial period great marine currents, transporting masses of drift as well as gigantic icebergs over sea bottoms which have since been raised into lands, have produced striations, flutings, roundings, and polishings, precisely similar to those which result from the advance and passage of terrestrial glaciers. Finland unquestionably was never passed over by a terrestrial glacier any more than was the northern portion of the United States of America; and for his clear demonstration of the fact as regarded his native land, the name of Nils Nordenskiold will ever be remembered. Professor Nordenskiold, who made several visits to this country, and attended two meetings of the British Association, was much liked for his unassuming and agreeable manners. His son, Professor Adolf Nordenskiold, of Stockholm, is well entitled to take the place of his honoured parent for his recent researches in Spitzbergen, and particularly for his excellent map of that country.

Baron Charles Claus von der DECKEN.—The melancholy fate of this high-spirited Hanoverian nobleman, in his endeavour to reach the interior of Africa by ascending the River Juba in a steamer, has been recently brought before you; and no one has more truly deplored this catastrophe than myself, who only two years ago had to offer to him in your name the highest honour which we have to bestow.

Baron C. C. von der Decken was born in 1833, at Kotzen, in Brandenburg, of a family of high rank. His father, Ernest von der Decken, fought, as one of the brave German Legion in the British service at the battle of Waterloo, and afterwards filled several stations of importance at the Court of Hanover during the reigns of George IV., William IV., and Ernest, King of Hanover. In 1816 he married Adelheid von Stechow (who, after his death, married Prince Pless), and by whom he had three children, our traveller being the youngest.

As a youth, Charles von der Decken evinced a strong desire to visit distant lands, whilst the study of history, geography, and mechanics, as well as the construction of maps, gave him much pleasure.

Having entered the Cadet corps at the age of sixteen, he was patronised by the King, and in 1850 entered the Hanoverian army as a lieutenant in the Queen's Hussars. He availed himself of his leave of absence to travel through Europe, and in 1858 he made his first endeavour to penetrate into Africa, but was prevented from advancing across the desert by an attack of fever, which compelled him to return.

In 1860 he quitted the army, and soon after embarked at Hamburgh for Zanzibar, it being his intention to join his countryman Dr. Roscher in an endeavour to reach the great Nyassa Lake. The murder of Roscher compelled von der Decken to choose another line of research, and he went in an Arab dhow, accompanied only by his servant Corelli, to Kiloa; but failing to induce carriers to accompany him, he returned to Zanzibar. A second effort was also unsuccessful; for although he then contrived to secure a sufficient escort, his men deserted, and his soldiers mutinied; so that, after penetrating a certain distance, his efforts during three months of much privation were unavailing, though, as shown by his works just published in Germany, he acquired some useful knowledge of the country. Being once more at Zanzibar, in 1861, he projected an expedition to examine the great mountain of Kilimandjaro, to ascertain if the report of the missionaries Krapft and Rebmann was true, who stated that its summit was covered with snow; he induced our countryman, the zealous young geologist, Richard Thornton, who had left Livingstone, to accompany him. The result was, that Thornton constructed a large contoured map of the mountain, determined its mineral characters, and, in conjunction with the Baron, made a vast number of physical observations on altitude, temperature, latitude and longitude, some of which have been published in the last volume of our Journal (vol. xxxv. p. 15). In October, 1862, Charles von der Decken made another and a still more successful effort to complete the examination of the same great mountain, which he then ascended to the height of 14,000 ft., or 6000 ft. higher than on the previous occasion, being accompanied by the astronomer and physicist Dr. Karsten. By this survey the altitude of Kilimandjaro was fixed at upwards of 20,000 feet, and it was clearly proved to be a snow-capped mountain.

Returning to Europe in 1863, having visited the Isle of France by the way, it was in consideration of his distinguished services that we awarded to him our founder's gold medal, whilst the King of Hanover conferred upon him the Guelphic Order.

Thus encouraged, he next resolved to employ his means in fitting out such an expedition as would enable him to ascend far into the interior of Africa, by one of the deepest of the rivers which flow through the Somauli country to the north of Zanzibar and Mombas.

Having been privy to the strenuous efforts he made to construct a large and a small steamer suited to river navigation, it gave me the truest pleasure to afford this distinguished man every possible aid. Thus the vessels constructed at Hamburgh had to be transported in pieces on board a ship to be chartered for Zanzibar; and as at that time the Danish war was rife, it was necessary to obtain a free passport from the Danish Government for the purpose of this scientific expedition. Then, again, it was essential to raise the position of von der Decken in the estimation of the Sultan of Zanzibar, who had an immense respect for the English, but none whatever for a German traveller. Good credentials were therefore obtained from the Foreign Office, and the Duke of Somerset most considerately gave orders that the British naval force at Zanzibar should not only aid him in putting his steamers together, but should assist in getting them over the bar of any river he might wish to ascend.

Having organised a strong and well-selected party of Germans, including Lieutenant von Schickh of the Austrian navy, Dr. Link, and others, he sent the vessel round by sea, going himself by way of Egypt, chiefly in the hope of inducing the Pasha to allow him to take with him some negro soldiers out of the Egyptian army; but in this he met with disappointment.

Arrived at Zanzibar, and having put his vessels together, he first made a fruitless attempt to enter the River Ozi or Dana, and finally entered the Juba in his larger steamer, the smaller vessel and one of his companions having been lost on the bar of that river. He had, as you know, ascended that stream for about 380 miles, when the fatalities occurred by which the loss of the ship was followed, as we are informed on the testimony of his native followers who escaped, by the murder of this devoted explorer and his companion Dr. Link.

I forbear to enter now upon further details of his life; for full justice can only be done to the memory of my lamented friend in an extended memoir. I now simply conclude by reminding you of the gallant perseverance with which, undaunted by frequent attacks of fever, and the hostility of the natives, he overcame

obstacles, and by two expeditions elicited, for the first time, the true physical and natural history characters of the lofty snowy equatorial mountain of Kilimandjaro; and, lastly, how at great cost he organised such an expedition as no other individual has ever conducted, at his own cost, to Africa. If we consider how chivalrously he resolved to penetrate into the interior by the most difficult of all the lines of research, and one never attempted by any former traveller, magnanimously resolving to "do or die," we must all admire such noble conduct. His affectionate mother, the Princess Pless, and his only brother, plunged as they have been into the deepest distress, would still cling to any shred of hope that he may still be alive, and a captive; but, alas! all persons at Zanzibar who are the best qualified to form a just opinion have no doubt that this high-minded and courageous traveller, as well as his associate Link, are no more. All honour to their memory!

Jacob SWART was for several years our Corresponding Member for Holland, a country whose geographical enterprise and literature place it in a very high rank among the nations of Europe. He was born at Amsterdam, July 17th, 1796, and educated chiefly at Dordrecht and the Hague. At twenty years of age he entered the Dutch Royal Navy, passing a few years in their East India possessions. Returning to Holland, and finding a sea-life distasteful, he resigned his commission, and applied himself vigorously to his favourite study of mathematics, and afterwards became a professor in the Royal Naval School in Amsterdam. Soon after this he associated himself with the ancient house of G. Hulst van Keulen, whose nautical publications, for more than two centuries, have been well known throughout the world, and which, during the early part of its existence, supplied all Europe with charts. Early in life he composed a valuable collection of astronomical and nautical tables, still in great estimation; and these, with several other works of a similar nature, established his claim to acknowledged usefulness. This was recognised by his being appointed to various positions in the administration of naval matters, and to honorary association with many of the excellent Societies which characterise the Netherlands. As a further mark of appreciation of his good services, the King, in 1847, invested him with the Order of the Eiken Kroon. In 1841 he started his excellent nautical review, the 'Verhandelingen en Berigten betrekkelijk het Zeewezen,' &c., which, continued to the present day, contains a vast mass of valuable geographical information, and that especially relating to the East

India possessions of the Netherlands. About this time also he drew up an extensive and fine series of charts of the Indian Sea, which embraced the entire amount of our knowledge of its hydrography. Among others of his very numerous works he drew up a Memoir, accompanying an unpublished journal and map, of the celebrated southern voyage of his famous countryman Tasman, a work of great interest. Employed incessantly and laboriously with many literary and public duties, his health failed in 1863, and he died in his native city, much esteemed, on March 14th in the present year. Our library and Journal have been enriched by several valuable contributions by him.

Capitaine DUPERREY.—Louis Isidore Duperrey, member of the Institute of France, and one of our Honorary Corresponding Members, was born at Paris the 21st of October, 1786. He entered the French navy at the age of sixteen, and in 1811 contributed to the Hydrographical Survey of the coasts of Tuscany. In 1817 he embarked as midshipman in the *Uranie*, and accompanied Captain Freycinet in a scientific voyage round the world. He became Lieutenant in 1822, and in that year set sail from Toulon as Commander of the *Coquille*, in which vessel he made one of those scientific voyages which redound so much to the honour of a nation, returning to Marseilles on March 24th, 1825. The theatre of his explorations was South America and Oceania, and he made during his voyage a large number of observations on the pendulum, which served to demonstrate the equality of the flattening of the two hemispheres and contributed to the determination of the magnetic equator. Geography owes to him also maps of the Caroline Islands and Dangerous Archipelago. He was also the author of several memoirs published in the '*Annales de Physique et de Chimie*,' and in the '*Annales Maritimes*,' &c. &c. The great merit of his labours, particularly those on terrestrial magnetism, gained him admission into the *Académie des Sciences* in 1842. He died in the month of August last.

Admiral Don Eduardo CARRASCO.—This distinguished Peruvian was born in Lima on the 13th of October, 1779, the son of Don José Carrasco, a Spanish noble and rich merchant of Lima. In 1794 he entered the Royal Naval Academy of Peru to study for the naval profession, and in 1800 embarked as assistant "Piloto" on board the frigate *Fuente Hermosa*, being engaged in subsequent years, when not cruizing in the Pacific, as one of the naval teachers in Lima. In after years he became impressed with the liberal views then so prevalent, and was one of the first to excite in his native land that

spirit of resistance to Spanish authority which led to the War of Independence. Dismissed from the service in consequence of these opinions in 1818, he devoted himself to the study of medicine, and on the declaration of Independence in 1821 was made by General San Martin Secretary-General of the new Republic. The late Admiral Fitzroy, who visited Peru in the *Beagle* in 1835, testified in his narrative to the information and assistance he obtained from Captain Carrasco, who was then Director of the Naval Academy of Lima. In 1839 Carrasco succeeded his friend Paredes as *Cosmographo Mayor* of Peru, and in 1855 became Rear-Admiral. During these years he completed a map of the confederated republics, by order of General Santa Cruz, and this was then the best map known of these countries. The '*Calendario y Guia de Forasteros*,' which he first published in 1826, was replete with geographical, historical, and statistical information with regard to Peru. Admiral Carrasco was elected honorary member of our Society in 1839, on the recommendation of Admiral Fitzroy. He died on the 16th November last.

Professor KUPFFER.—This distinguished member of the Imperial Academy of Sciences of St. Petersburg was one of our Honorary Foreign Associates, and during many years exerted himself with great pertinacity and perseverance in establishing magnetical observations in various parts of the Russian empire. To the value of these labours General Sabine, the President of the Royal Society, has borne testimony.

Besides his travels to the Caucasus and the Ural, and his descriptions of the structure of those mountains, Professor Kupffer rendered practical service to his country by the publication of his great work 'Poids et Mesures Russes,' in two volumes imperial quarto, in which every Russian weight and measure has had its equivalent assigned in nearly all the other countries of the world.

Professor Kupffer was much attached to England and often visited our country, and the meetings of the British Association for the advancement of Science were twice attended by him. Among his other numerous works are the following, copies of which are in our Library:—Recherches Experimentales sur l'Elasticité des Metaux;' 'Note relative à la Temperature du Sol et de l'Air aux limites de la Culture des Céréales;' 'Annales de l'Observatoire Central de Russie,' and 'Annuaire Magnetique et Météorologique,' both of which serials he brought out for many years, besides the 'Compte-Rendu Annuel' and volumes of Tables of Meteorological and Magnetic Observations.

The Earl of DONOUGHMORE.—The Society has lost a staunch friend in Lord Donoughmore, who among his varied accomplishments had a true love for geography. Clear headed and anxious to be useful, he was, when not suffering from severe attacks of gout, to which he was subject, of great service in our Council. Every well-wisher to the Royal Geographical Society, and myself in particular, felt much indebted to this high-minded nobleman two years ago, when by his lucid explanation and fervent appeal to a General Meeting, he calmed an irritable feeling existing among a very few of our Fellows, which, if it had spread, would have been highly prejudicial to our well-being. His lordship's capacity for business, his clear elocution, and the weight of his opinions, enabled him to be of great service in his place in Parliament, and his death at the early age of 42 must be considered a national misfortune.

Lord MONTEAGLE.—This accomplished nobleman occupied many prominent public situations, including the Chancellorship of the Exchequer. In early days he distinguished himself in the University of Cambridge, and was through life earnest in supporting every intellectual advance, whether in the fine arts or in science. His name is bound up with many public events of this century which the historian will have to record, but which are foreign to the purpose of this short notice. I have only to add that Lord Monteagle was much beloved and respected by a large circle of friends, including myself, who enjoyed his cheerful, instructive, and agreeable society.

Dr. John LEE.—The late Dr. Lee, so widely known in various circles, was distinguished as an astronomer, and his biography will be most fittingly enlarged upon by the President of the Astronomical Society, of which he was so liberal a patron and formerly President. His name will be probably best remembered in after years by the finely illustrated volume 'Ædes Hartwellianæ,' which was written by his friend, our late associate, Admiral Smyth, and described the manor and mansion of Hartwell, the seat of Dr. Lee, together with the observatory, which, as I have already mentioned in this obituary notice, was originally the property of the Admiral. In this mansion Dr. Lee dispensed the most ready and hearty hospitality to all his friends, and especially to men of science. He was a man of wide and generous sympathies. For many years I have observed him to be a constant attendant at the meetings of the British Association, where his absence will be much felt. He died in February last, at the ripe age of eighty-one years.

Dr. Thomas Hodgkin.—The late Dr. Thomas Hodgkin, a member of the Society of Friends, who was so widely known as an active philanthropist, belonged for a period of fifteen years to the governing body of our Society, first as Honorary and afterwards as Foreign Secretary, and Member of Council. He was born in Pentonville in 1798, and having adopted the profession of medicine, filled in early life the posts of Demonstrator of Morbid Anatomy and Official Curator of the Pathological Museum at Guy's Hospital. During these years he published various treatises on medical subjects, and distinguished himself as an earnest advocate of projects of medical reform. He was subsequently nominated Member of the Senate of the University of London, on the establishment of that institution in 1836—a post which he continued to occupy till his death. On the death of his friend Dr. Prichard, the eminent author of the 'Physical History of Man,' Dr. Hodgkin read a most interesting memoir of his life before the Ethnological Society (1849). Although he had not achieved a reputation as a geographer or traveller, Dr. Hodgkin made good use of his general scientific attainments and powers of observation during the various journeys to distant countries which he made, in pursuit of the noble philanthropic objects that occupied so large a portion of his attention. It was thus that, after his return from the mission to Morocco, which he undertook in company with Sir Moses Montefiore, for the purpose of obtaining from the Sultan concessions in favour of the Jewish population, he communicated a paper to this Society, containing his observations on the physical geography of the region. He also made two journeys to the Holy Land on philanthropic errands; and it was whilst on the second of these that he was seized with the illness which terminated his useful life at Jaffa on the 5th of April last.

George Rennie.—Among the eminent practical Civil Engineers of our day, my valued friend the late George Rennie stood pre-eminent. The eldest son of John Rennie, whose great engineering works are known in many a country, our deceased member, after an early education in London and its environs, was sent to the land of his fathers; and at Edinburgh, under Professors Playfair, Leslie, Hope, Christisson, and Dunbar, he acquired those sound elements of knowledge which were ever afterwards conspicuous in all his works. After some years of service in the Mint, he went into partnership with his younger brother, the present Sir John Rennie; and thenceforward his career was marked by a continuous

series of important mechanical operations at home and abroad, whether in our dockyards or for the governments of Portugal, Mexico, Peru, Turkey, and Russia. Together with his brother and Mr. C. Vignoles, he laid out the line of the Liverpool and Manchester Railway, as designed by George Stephenson, and, what is remarkable in engineering affairs, the cost of completing this famous work as carried over the Chat Moss was less than the estimate by fifty-seven thousand pounds! If the railway gauge proposed on that occasion by the brothers Rennie had been adopted (viz. 5 feet 6 inches) the country would never have been agitated by the controversy of the broad and narrow gauges; for that width, which is in force in Ireland and elsewhere, is now admitted by all parties to be the best.

It is not for me to enumerate the many other important works of our deceased member. I may, however, say that the brothers Rennie, though not the original inventors, were the first to introduce screw-propellers into the British navy, in 1840, thus producing a great revolution in seamanship and maritime tactics; it being a curious fact that John Rennie, the father, first introduced paddle-steamers into the navy in 1819.

Much of the spare time of Mr. George Rennie was devoted to purely scientific pursuits. As early as 1822, he became a Fellow of the Royal Society, and, in virtue of his sound contributions as published in the 'Philosophical Transactions,' he attained the honour of being the treasurer or second officer of the parent Scientific Society. His Reports, published in the volumes of the British Association for the Advancement of Science, are also standard evidences of his knowledge, and will assuredly secure for him a forward place among the men of science of our age. With these mental qualifications Mr. George Rennie united in his own character the most engaging kindness of manner, so that I can safely affirm that amidst my scientific friends I knew no one who was more generally beloved and respected than himself. He died on Good Friday last, after a long illness brought on some years ago by having been accidentally run over by a carriage.

Dr. William Freeman DANIELL distinguished himself by the ardour with which he pursued various branches of science during a long residence as medical officer on the West Coast of Africa. In 1849 he published a valuable work, embodying some of the results of his experience, under the title of 'Sketches of the Medical Topography and Native Diseases of the Gulf of Guinea.' He also wrote a work

on the copals of Western Africa, and became very favourably known amongst botanists by the success with which he cultivated the economical and medicinal branches of the science, in the countries where he was stationed. On his return from his seventeen years' residence in the pestilential climate of Western Africa, he was, to the surprise of us all, in the enjoyment of robust health; but on his removal to Jamaica, after he had served in the expedition to China in 1860, his constitution gave way, and he returned to England in 1864 completely shattered in health. He died on the 26th of June last, at the early age of forty-seven. Dr. Daniell was member of the College of Surgeons and Fellow of the Linnean Society. His kind disposition, disinterestedness, and fidelity to his friends, endeared him to all who had the advantage of his acquaintance.

Commodore CRACROFT, C. B., died in Jamaica on August 2nd of this year, aged 49. The second son of Colonel Cracroft, of Hackthorne, Lincolnshire, he entered the Royal Navy in the year 1828, was promoted to rank of lieutenant in 1841, and served as flag lieutenant to Admiral Hyde Parker at Portsmouth. Obtaining the rank of commander in 1846, he proceeded to China in command of the *Reynard*, and while actively engaged in operating against the pirates, he added considerably to our hydrographical knowledge of those seas, but was unfortunate enough to lose his vessel on the Pratas shoal. During the Russian war he served with Sir H. Keppel in the *St. Jean d'Acre*; and subsequently, in command of the *Gorgon*, he took part in the reduction of Bomarsund. In 1854 he was appointed captain of the *Niger*, and proceeding in that vessel he took a prominent part in quelling the first Maori insurrection in New Zealand, and was the means of rescuing a party of volunteers and many colonists from destruction by the natives. For these services he was nominated a Companion of the Bath, and in 1863 he succeeded Commodore Dunlop in the command at Jamaica, where he unfortunately fell a victim to fever after a few days' illness.

In addition to the persons whose names have been already mentioned, the Society has to regret the loss of the following Fellows:—Mr. M. W. Atwood, Mr. R. S. Black, Mr. George Bower, Mr. J. G. Cole, Mr. G. Wingrove Cooke, Viscount Cranbourne, Mr. R. H. Davies, Colonel the Honourable A. Egerton, Mr. F. Goldsmid, Mr. Christian Hellmann, Mr. W. H. T. E. Huskisson, Captain H. J. Hartstene, the Rev. C. C. Hill, Mr. G. F. Heneage, Mr. F. N. Isaac, Mr. Pliny Miles, Mr. E. Markham, Captain P. Maughan, Rev. C. Oakley, Mr. Benjamin Oliveira, Mr. Henry Reeves, Mr. J. A.

Olding, Colonel C. Sim, Major W. H. Sitwell, Mr. Robert Sweeting, Mr. A. Spottiswoode, Mr. H. F. Southey, Mr. Franklin Travers, Mr. F. Verbeke, General Sir E. C. Whinyates, K.C.B., and Mr. Robert White.

Several of these noblemen and gentlemen were distinguished for their acquirements, though no one of them, as far as I know, has contributed directly to the advance of Geographical science. One of them, however, the late Mr. Benjamin Oliveira, formerly a member of Parliament, deserves grateful notice on our part, inasmuch as he has bequeathed a sum of money, the exact amount of which is not yet ascertained, to increase the funds of the Royal Geographical Society.

ADMIRALTY SURVEYS.—The following resumé, as drawn up by the Hydrographer,* will show the progress which has been made in the various surveys carried on under the direction of the Admiralty during the year which has just passed.

Although from various causes, which could not have been foreseen or guarded against, the Hydrographical Survey has in some parts of the world fallen short of the average amount of work performed during preceding years, yet in other cases it has been very much exceeded; and on the whole we may fairly consider that the efforts of those engaged in these onerous and often trying duties have been as successful as could have been desired or expected.

The modified system in regard to the home surveys alluded to in the report of the year 1865 is now in full operation, and the introduction of a new element into our foreign surveys, by appropriating a small ship of war on the principal naval stations to auxiliary or occasional surveying duties, has been carried out in China and North America with a fair prospect of success.

Not the least gratifying feature of this report is the increased interest which has been taken in geographical and hydrographical subjects by naval officers generally, as evinced by numerous, and in many cases important, remarks as well as plans received from them, and which may perhaps in some measure be fairly attributed to the liberal supply of charts which is now dispensed by the Admiralty to officers of all grades in her Majesty's ships.

Coasts of the United Kingdom.—Captain E. J. Bedford, with his three

* Captain Richards, R.N.

assistants in the *Lightning*, have been employed in completing the soundings off the western coast of Scotland and the Hebrides, and have made a careful re-examination of the Sound of Mull, with additions and corrections to various parts of the coast.

This vessel is for the present removed to the south-western coast of England, and has commenced a re-survey of Cardiff Roads and the neighbourhood, rendered necessary both in consequence of the changes which have taken place in many of the banks since the last survey by Captain Beechey in 1849, and of the vastly increasing commerce in the ports of the Bristol Channel.

Staff-Commander E. K. Calver and his party of three have completed a thoroughly new and excellent survey of the Downs, and have also entirely resurveyed Yarmouth and Lowestoft Roads, including the coast between Winterton and Southwold. Both of these works were much required, owing to the very considerable shifting of the banks which had taken place, especially on the shores of Suffolk.

Commander Brooker has been employed with a steam launch in the neighbourhood of Spithead and the Bar of Portsmouth Harbour, where the constant attention of a surveying officer is required to watch and record the changes which are taking place, owing to natural and artificial causes; he has re-surveyed part of the Medina River at Cowes, where marked improvements have been made by dredging and buoying.

The Channel Islands survey, under Staff-Commander John Richards and Mr. W. B. Calver, Master, has progressed very favourably, and the eastern and western coasts of Jersey, with numerous soundings, have been added to the southern shores of that island, which part was surveyed last year. New Sailing Directions for Jersey have also been prepared by the former officer, and published by the Admiralty.

Foreign Surveys.—The Mediterranean surveys under Captain Mansell in the *Hydra*, and Commander Wilkinson in the *Firefly*, with their respective assistants, have made very good progress during the past season. Captain Mansell has minutely surveyed the western coast of the Morea from the Gulf of Patras to the eastern shore of the Gulf of Kalamata, together with several plans of anchorages. The whole of the Morea may now be said to be very fairly charted, although it will be desirable, when more important work is completed, that some additional soundings should be obtained and a re-examination of the shore made between the Gulf of Kalamata and Cape Matapan. Captain Mansell has retired from his long

and useful labours, after a period of thirty-two years passed in the surveying branch of his profession, and has been succeeded by Captain Shortland in the command of the *Hydra*.

Commander Wilkinson during the past season has completed the coast of Tunis from Cape Bon to the southern part of the Bay of Kabes, with its off-lying islands and shoals, also the Gulf of Tunis, with plans of the anchorage off the Goletta, and the Bay of Hammamat; he has likewise completed the western coast of Sicily from the Gulf of Castel-a-mare on the north to Cape St. Marco on the south; disproved by numerous soundings the existence of the Fox Rock off the south coast of Sardinia, which had so long been a source of anxiety to navigators; made plans of the anchorages on the south coast of that island, and added considerably to the soundings in the Malta Channel. The *Firefly* has now been withdrawn from the Mediterranean survey, which will henceforth be carried on by the *Hydra* alone.

China and Japan.—The *Swallow* and *Dove*, under Mr. Edward Wilds and Mr. George Stanley, Masters, have been very profitably employed in Northern China; having completed the examination of the Shantung Peninsula and surveyed a considerable portion of the western coast of the Island of Formosa, sounded the channels between that island and the main, and added very materially to the soundings generally in the northern portion of the China Sea between Hong Kong and the Corea. The *Swallow*, having completed her time, is on her passage to England.

The *Rifleman*, under Commander Ward, has added something to our knowledge of the reefs in the main route to China, and has resurveyed Victoria Harbour in the Island of Labuan.

The *Serpent*, Commander Bullock, performing in addition to the duties of a ship of war, those of an auxiliary surveying-vessel, and attached to the squadron of Vice-Admiral King in China, has already contributed much useful information; consisting of soundings and observations on the currents on L'Agulhas Bank, the rectification of the positions of doubtful dangers at the western entrance of the Java Sea, a correction of the survey of St. Paul's Island in the Indian Ocean, a plan of the entrance of Bruni River in Borneo, as well as various soundings in the Palawan Passage and China Sea.

Colonial Surveys.—Nova Scotia. The survey of the coasts of this colony has been brought to a close by Commander P. A. Scott, who was materially aided during the past season by Captain Hamilton of the *Sphinx*, in obtaining the soundings at the entrance of the Bay

of Fundy and off the south-east coast; a service requiring much judgment, and not unattended with risk, on a coast almost continually enveloped in fogs and subject to strong and uncertain currents. Additional soundings are still required in the Bay of Fundy, which will be obtained, during the short intervals of favourable weather which present themselves in September and October, by one of the squadron under Sir James Hope.

Newfoundland.—This important survey is progressing favourably under Mr. J. H. Kerr, Master R.N. During the past year he has surveyed Random and Smith Sounds and other portions of the west side of Trinity Bay; thus completing the whole of that bay to Cape Bona Vista.

West Indies.—Mr. Parsons, Master R.N., who is conducting this survey in a small hired vessel, has completed during 1865 the survey of the island of Tobago; and Commander Chimino, in H.M.S. *Gannet*, has commenced and almost completed the whole of the Gulf of Paria, with a considerable portion of the coast of Trinidad; in both of which great discrepancies were found to exist in the present charts.

British Columbia.—Mr. Pender, Master R.N., in charge of the survey in this colony, has, with his two assistants, surveyed the extensive estuary known as Knight's Inlet, with the many channels and passages leading into it from Queen Charlotte Sound, Broughton and Johnstone Straits. The islands are so numerous and the coasts so much broken that although it is not more than 70 miles from the entrance to the head of the inlet, yet its shores comprise an extent of coast-line amounting to upwards of 700 miles.

The entrance of Smith Sound to the north-westward, and immediately to the northward of the north point of Vancouver Island, has also been examined, and an excellent and convenient harbour discovered; thus the whole of the mainland of British Columbia, from its southern boundary in the parallel of 49° N. to the entrance of Fitzhugh Sound in 51° 20′, is now accurately laid down on our charts; probably the most intricate and broken stretch of coast in the world. The survey is progressing northward to our northern boundary in 54° 30′ N., and the recent discovery of good coal in Queen Charlotte Island has rendered it necessary that a portion of the shores of that island should at once be examined.

South Africa.—Mr. W. Stanton, Master R.N., who succeeded to the charge of this survey in March, 1865, has already made rapid

progress with the examination and charting of the coast; having completed from Cape Infanta to Izervack Point, a distance of 60 miles, and from Cape St. Francis to Recife Point, a further distance of 68 miles. Owing to the exposed character of this coast the difficulties of obtaining the soundings are very great; but during the past season Mr. Daniel May, Master R.N., the chief-assistant, and for some time in temporary charge, was enabled to sound a considerable portion of the coast, through the assistance rendered him by Commander C. Jago of H.M.S. *Rapid*.

New South Wales.—Commander Sidney and his two assistants have been very successful during the past season, and have completed the coast of New South Wales, from the Solitary Islands to Point Danger, the northern boundary of the colony; and where the work has been satisfactorily connected with the Queensland Survey brought southward from Moreton Bay. They have also commenced a resurvey of Port Stephens, and have surveyed the coast from it northward to Sugar Loaf Point. The remaining portion of the seaboard of the colony, from Sydney southward to Cape Howe, now requires to be rectified, to place it on the same footing of accuracy with that already accomplished to the north; and arrangements are made to carry out this desirable object.

Queensland.—Staff-Commander Jeffery and his assistant Mr. Stanley, Master R.N., have completed the survey of the northern entrance to Great Sandy Strait; have connected the southern boundary of the colony with Commander Sidney's work at Point Danger; and are now employed in examining the coast between that point and the northern extremity of Moreton Island.

In the examination of this portion of Queensland, much assistance has been rendered by Commander Nares in the *Salamander*; this vessel is specially employed on the coast of Queensland in connexion with the semi-Imperial establishment at Cape York, and her commander loses no opportunity of adding to our hydographical knowledge of that magnificent channel, known as the Inner Passage, leading from Australia to our Indian possessions; and along the shores of which (owing in a great measure to the energy and perseverance of that intelligent and enlightened geographer Sir George Bowen, the Governor of the Colony) colonization is spreading so rapidly as already to have reached the head of the Gulf of Carpentaria.

There is every reason to believe that at no distant day there will

be regular steam-communication to India and England through this Inner Passage.

The *Salamander* is at the present time engaged in making an examination of the eastern and southern shores of the Great Gulf of Carpentaria.

Victoria.—In this colony Commander Cox, with his staff, has completed, on a very elaborate scale, the harbour of Western Port, and has surveyed the intervening coast between it and Port Phillip.

South Australia.—The survey of the coast of this colony, at present under the temporary charge of Mr. Frederic Howard, Master R.N., was transferred more than two years since, at the request of the local Government, to the north-western portion of the territory, in connection with the establishment of a new settlement in the neighbourhood of the Adelaide River. It was hoped that ere this Mr. Howard and his party would have returned; and resumed the much-to-be-desired examination of the southern coast; but, owing to the ill success which has hitherto attended the efforts to establish this new settlement, the little surveying-vessel *Beatrice* has been chiefly employed in reconnoitring the neighbouring coasts of Port Darwin and the Victoria River; and, indeed, in attending upon and carrying provisions and stores for the colonists. Thus, although the surveying officers and their crew have worked with the greatest energy and zeal, and have suffered very many privations, we have little to show for their labours during the last two years in the way of charts or hydrographical information of value to the navigator. What could be done, however, has been done. Adam Bay, the site of the settlement, has been surveyed; casual reconnaissances have been made of Melville Strait, Van Diemen's Gulf, and the western shores of the Gulf of Carpentaria, together with soundings wherever they could be obtained.

It is much to be desired, and it is expected, that the *Beatrice* will very shortly resume the more important work originally assigned to her on the southern coasts of Australia.

To sum up the actual results of the labours of the Hydrographic Department, on shore and afloat, it may be stated that sixty-three new charts, including portions of almost every part of the globe, have been published during the year 1865. Among them a chart of the southern hemisphere on the Polar Projection, illustrative of the ice-drift during the different seasons; and showing to what extent the great circle or composite routes between the Cape of Good

Hope, Australia, and Cape Horn, may be ventured on with safety. This chart has been carefully compiled from the observations of all the Antarctic navigators since the time of Cook; and, from the valuable papers on icebergs in the Southern Ocean by Mr. Towson, as well as documents from the Meteorological Department of the Board of Trade, additions and corrections have likewise been made to 1200 original plates. The number of charts printed has been 169,000. A new book of Sailing Directions has been published for the west coast of Hindostan, and new editions have been brought out of the West India Pilot, Part 2; South American Pilot, Part 2; East Coast of Africa; and the Island of Jersey; together with the annual tide-tables, lighthouse books, pamphlets, hydrographical notices, &c.

It is gratifying to add to this brief sketch of the labours of our Naval Surveyors, that many useful contributions have been received during the past year from officers engaged in the regular branch of the naval service; and especially from the squadron under Admiral Sir James Hope, G.C.B., in North America and the West Indies; and it is due to Captain Hamilton of the *Sphinx*, Mr. Dathan, Master of the Admiral's flag-ship, Mr. Cavenaugh, Master of the *Cordelia*, and Mr. Dixon, of the *Rosario*, to remark that they stand prominently forward among the many who have shown an interest in geographical research. Commander St. John of the *Opossum*, while engaged in seeking out the haunts of the Chinese pirates, has never omitted an opportunity of turning his talent for hydrography to good account; and we are indebted to him for the greater part of the knowledge we possess of the shores of the great Island of Hainan, in the Gulf of Tongking, as well as many others of the less frequented parts of the coast of China.

To Mr. Tilley, Master R.N., in command of Bishop Patterson's missionary yacht the *Southern Cross*, we are also much indebted for valuable remarks, as well as plans of many of the islands in the little-visited portion of the South-West Pacific.

It will have been noticed that the *Firefly*, Commander Wilkinson, has been withdrawn from the Mediterranean, and that the *Swallow*, Mr. Wilds, is on her way to England from China; it is by no means, however, in contemplation to reduce during the ensuing year the force engaged in surveying operations. In China, the Corea, Japan, and among the islands of the Eastern Archipelago, there exists, and will exist for a long time to come, a wide field for geo-

graphical and hydrographical research; and it is proposed to replace the *Swallow* by another vessel specially prepared for this service.

It is also the intention of the Admiralty to send a vessel to re-survey the Strait of Magellan, and to examine those remarkable inland channels which, extending nearly 400 miles along the western side of South America, enable large steamers to enter the Pacific in a comparatively low latitude and tranquil sea, and thus avoid the boisterous region of Cape Horn, with its storms and ice-bergs. Geographers will not fail to remember that Patagonia and Tierra del Fuego have been the scene of the labours of some of our most eminent explorers and surveyors, but natural causes produce changes more or less affecting navigation on most coasts, and the requirements of the seaman keep pace with the march of time.

Moreover, the rapid strides which science and art have made within the last quarter of a century demand that the improved means and appliances which they have placed within our reach should be turned to account for the improvement of navigation, and the consequent advancement of commercial enterprise and prosperity.

METEOROLOGY.—I invite with much satisfaction your attention to the Report of a Committee appointed to consider certain questions relating to the Meteorological Department of the Board of Trade, which I consider to be one of the most valuable documents ever laid before Parliament and the public in the form of a Blue Book, whilst it must be peculiarly interesting to all geographers. Upon the lamented death of Admiral Fitzroy a correspondence took place between the Board of Trade and the Royal Society respecting the future conduct of the Meteorological Department; and a Committee, formed in consequence, and consisting of our associate Mr. Francis Galton, Commander Evans, R.N., and Mr. T. H. Farrer, have prepared a clear account of the best measures to be taken to procure meteorological statistics of the ocean, or as respects weather telegraphy, in or affecting the British Isles.

In the numerous observations made at sea, and collected first by Maury, in 1852, and in the suggestion during the same year by Sir John Burgoyne, to establish meteorological stations on land, we mark the rise of a new branch of meteorological statistics. Through the subsequent co-operation of the Royal Society and its President General Sabine, as well as by the recommendation of a Congress held at Brussels, this system was brought into operation under

the Board of Trade with Admiral Fitzroy at its head. That eminent man commenced by carrying out the wishes of the Royal Society, but in the sequel was overpowered by the enormous accumulation of materials collected at sea through the united efforts of the naval and mercantile marine of Britain, and the registering of all these data was abandoned. The Committee urgently recommend the resumption of the registering of all the meteorological observations made at sea, and describe the best methods to be followed in extracting observations.

It further appears that much remains to be done in completing the desiderata pointed out by the Royal Society relating to barometric pressure, aqueous vapour, temperature of the atmosphere and surface of the sea, temperature, direction, and velocity of ocean currents, and limits of the trade winds and monsoons. Good practical suggestions are offered in relation to the works now in progress or to be executed, and as to the method of tabulating and publishing the results of meteorological and other observations useful to navigation.

After giving a sketch of the history of the foretelling of storms by means of telegraphing the state of the weather at great distances, as practised so successfully to a great extent by Admiral Fitzroy in this country and in foreign countries by Le Verrier, Dové and others, and after pointing out the great difference between the power of foretelling great occasional storms and the uncertainties of daily forecasts, the Committee use these words:—"The practice of issuing daily official notices of the weather, the truth of which is warranted neither by science nor by experience, is inconsistent with the position and functions of a Government Department, and must be prejudicial to the advancement of true science."

On the other hand, they advocate the continuation of the publication of telegraphic reports and remarks, and the issuing of storm warnings. Respecting the latter it is believed that, so far as they indicate the force of the wind, they are sufficiently correct to be of some value; but that, so far as they indicate the direction as combined with the force of wind, they are not sufficiently correct to be of real value. It is anticipated, however, that more accurate observation and more careful use of the materials already on hand may, at some future time, lead to a more successful result in these popular warnings.

Adopting the recommendation of the President and Council of the Royal Society, that stations shall be established for self-recording observations, and after a minute and detailed analysis of all the

means to be employed and the expenses to be incurred, the Report concludes in these words which have much gratified me. "If a more scientific method should hereafter succeed in placing the practice of foretelling weather on a clear and certain basis, it will not be forgotten that it was Admiral Fitzroy who gave the first impulse to this branch of inquiry, who induced men of science and the public to take interest in it, and who sacrificed his life to the cause."

In regard to the broader subject of weather-changes in all parts of the world, I cannot do better than extract one of the final passages of this able Report, as being of great interest to geographers.

"Considering (say the reporters) the wide extension of civilization and of British colonization and influence, it seems only reasonable that we should possess some regular record of the broad peculiarities of all the great weather-changes that affect the globe. A knowledge of the various regions of exceptional drought, of wet, of heat or of cold, of the deflection of normal currents of air or of the sea, of the variation of the limits of the polar ice, and other phenomena is required; and for this purpose much more of course will be needed than either the ocean statistics or the weather-changes in and near the British Isles, which form the special subjects of our recommendation. . . . . We look forward, however, to the establishment, at no distant period, of a regular record of the weather-changes over the greater portion of the globe, through international effort, and especially by means of the observations of British subjects on shore and afloat." *

NEW PUBLICATIONS.—The new publications of a geographical nature which have appeared during the year in this and in other countries, are, as in previous years, too numerous for me to pretend to pass

* The general conclusions arrived at by the authors of the Report are to the following effect:—

1. The collection of Observations from the captains of ships to remain with the Board of Trade.

2. The digesting and tabulating Results of Observations not to continue under a Government Department, but to be wholly under the direction of a scientific body,—such as a Committee of the Royal Society or of the British Association.

3. The procuring and sending daily telegrams and the issuing of Storm-warnings to be under the charge of the same body.

4. For these purposes an annual vote of 10,500*l.* would be required to be granted, on the condition of rendering a yearly account and report to Parliament, leaving to the scientific body entrusted with it perfect freedom in their method and in their choice of labour.

5. The existing Observatory of the British Association at Kew, with the addition of a small branch establishment in London, might be easily developed to carry this scheme into effect.

*

them all in review, however briefly. The 'Mittheilungen' of our honorary associate Dr. Petermann has appeared during the last twelve months with its usual regularity, and has contained, besides a number of original memoirs and illustrative maps, a *resumé*, from time to time, of current geographical literature. This repertory of valuable information must necessarily be consulted by all who make geography their study.

With regard to other works published on the Continent, I shall presently make mention of M. Pauthier's edition of 'Marco Polo,' one of the most important books of the year. Another work of much interest, relating to Asia, has appeared from the pen of Dr. Bastian, entitled 'Die Völker des Östlichen Asien in Studien und Reisen,' the result of five years' researches in Eastern Asia. Dr. Bastian is known to us as having contributed a memoir to the last volume of our Journal, on the ruined cities and buildings of Cambodia, and has devoted himself with great ardour and conscientiousness to this line of research. The work here mentioned is to extend to five volumes, two of which have now been published.

In our own country, the appearance of several books of travel and geographical works, richly illustrated in chromo-lithography, seems to me to be well worthy of notice, as I have often had occasion to express my regret that valuable series of drawings sent home by travellers should remain unavailable, owing to the cost and difficulties of publication. Amongst this class of works issued during the past year by Messrs. Day and Son, is a volume on Madagascar, by our associate Lieutenant Oliver, containing many coloured illustrations, which convey a vivid idea of the scenery and people of this interesting island. Baines' Views of the Victoria Falls have also been published, and the same firm have now in preparation a fine series of views on the Niger by Mr. Valentine Robins, which were exhibited lately at one of our meetings, and Gully's magnificent sketches of mountain and glacier scenery in New Zealand, sent to this Society by Dr. Haast, and commented upon in my Address of 1864.

During the year two parts of the new edition of Fullarton's 'Imperial Gazeteer of England and Wales' have appeared; a work containing many plans of cities and towns, as well as numerous excellent maps, which must render it of the highest utility. A supplement to 'Blackie's Imperial Gazeteer' has also been lately published.

Lastly, amongst the works which have appeared in our own

country, I must mention the volume of 'Sailing Directions for the Indian Ocean,' from the pen of the accomplished geographer Mr. A. G. Findlay; a work in which is stored an immense amount of hydrographical and geographical information, and a worthy continuation of the series of books of a similar nature which the author has published.

Marco Polo and Mediæval Travellers to China.—Whilst our associate Colonel Yule has been occupied during the last year in producing a work on mediæval travels to China, for publication by the Hakluyt Society, an abstract of which has been recently sent to us for reading before our own body, M. Pauthier, the well-known Oriental and Chinese scholar, has brought out in Paris a work which must be highly interesting to all comparative geographers, under the title of 'Le Livre de Marco Polo.'* By publishing for the first time the original manuscripts in the old French of the 13th century, which have long lain in the National Library of Paris, and which were dictated by the great traveller in his prison at Genoa to his secretary Rusticiano di Pisa, M. Pauthier has done much to establish the fidelity of the narrative. Whilst the man of letters will luxuriate among the copious illustrations of the subject, whether in notes and commentaries, or in the references to a multitude of authors, who, besides our gifted countryman W. Marsden, have written upon Marco Polo, as well as in the supplemental historical chapters attached to this work, it is to the map especially of M. Pauthier that I would direct your attention. This map has great merit, both from its clear definition of the main physical features of the vast regions travelled over by the Commissary and Envoy of the great Mongolian Emperor Khubilai Khan, and also from having the names of the countries and places which were in use at that period, inserted in red letters, alongside of their present names as given in ordinary type. One of the main points of M. Pauthier is to show that the most reliable version of the travels of Marco Polo is that which was written in the French of the 13th century, then the language of chivalry and poetry, and which was corrected by the traveller himself. For, if the narrative was first given in the Venetian dialect, the Italian versions were, it is thought, taken from the old French manuscripts which in that age passed through the courts of France

* 'Le Livre de Marco Polo, citoyen de Venise, Conseiller privé et Commissaire Impérial de Khoubilai Khan, rédigé en Français par Rusticien de Pise,' &c. Paris. Firmin-Didot Frères. 1865.

and England, in which the romances of this very Rusticiano di Pisa were in vogue.

Leaving this critical question to be settled by scholars, we as geographers must hail with satisfaction this accession to the illustrations of the travels of Marco Polo, the Paladin of explorers, who not only first broke through the clouds of ignorance of the middle ages respecting the various countries of the earth, and prepared the way for the discoveries of Columbus and Vasco de Gama, but who also brought from China the first types of printers. What then would have been the admiration excited if in the lifetime of the illustrious Venetian, instead of having his story recited from scarce manuscripts, it had then, or shortly after, been circulated through Europe with the types of a Gutenberg and a Caxton.

Let us therefore applaud the words of M. Walckenaer, quoted by M. Pauthier, who has said that of the three men who in the grandeur of their discoveries have most contributed to the progress of geography or a knowledge of the globe, the modest name of the Venetian traveller may well be placed in the same line as that of Alexander the Great and Christopher Columbus.*

EUROPE.—*Eruption near Santorino.*—Our attention has recently been awakened to one of those sudden outbursts of volcanic matter which in the most ancient historical times have actually produced certain islands in the Ægean Sea, the largest of which is Santorino, or the ancient Thera. That island and the adjacent isles of Therasia and Aspronisi are simply segments of the former rim—the now broken edge—of one stupendous volcano, the crater of which is six to seven miles in diameter, and has been for ages a deep sea-bottom. From time to time a central portion of this vast crater has been subjected to renewals of this volcanic activity, and of these this Society was furnished sixteen years ago with abundant proofs in the able account given by Lieutenant Leycester, R.N., as published in the 20th volume of our Journal.† Referring back to Pliny, Strabo, and others, for the accounts of the earlier eruptions and subsidences,

* I must not omit to mention that a most valuable article on M. Pauthier's work has just appeared in the French 'Journal Asiatique' (for April—May, 1866), from the pen of M. Khanikof, a man who is admirably qualified to illustrate the routes of Marco Polo in Persia and the western part of Central Asia. The article is of some length, and written with peculiar clearness and force. This learned Orientalist seems to me to have clearly established the site of all the localities visited by Marco Polo in these countries, and to have thus contributed to remove our ignorance of the state of Persia and Central Asia in the thirteenth century.

† See also a full account of the phenomena in Lyell's 'Principles of Geology,' 9th edition. pp. 441 *et seq.*

he acquaints us that the tract remained in a state of quiescence for upwards of seven centuries, when the volcanic forces became again active in 1457, and were renewed in 1573 and 1650. After this last date all was tranquil in and around Santorino for fifty years: its vineyards were once more prolific, and the older inhabitants only could recollect the terrestrial revolution, when in the year 1707 the little island of Neo Kaimeni, to the west of Santorino, and lying between the Palæo and Mikro Kaimenis of former eruptions,* arose from the sea to the height of about 250 feet, and having the circumference of about a mile. At that time the surface was more or less disturbed at and around this spot for six years, and the action terminated in 1712 only. The dark-coloured insular rocks of the Kaimenis or Burnt Islands, thus formed, proved an inestimable advantage to the natives, in affording safe ports inside the grand old crater of Santorino.

It is just at this locality that the recent changes have occurred by which one newly-elevated mass of rock, composed of scoriæ and lava, has been added to the island of Neo Kaimeni, which has partly subsided, whilst another small island has been formed. Geologists might certainly have well speculated on the renewal at any time in this locality of such a phenomenon as that which has excited so much attention, not merely by looking back to historical records, but simply by the knowledge we have long had that the sea-bottom on this particular spot, the Bay of Exhalations, where the last changes have taken place, has been for many years affected by the emission of mineral springs containing sulphuric acid gases, which, oozing out in a natural harbour, the sides of which were formed by erupted masses, have rendered this anchoring-ground a bath in which the foul copper bottoms of ships have been in a short time cleansed of their impurities.

The antiquary will find in the account of Lieut. Leycester the description of the various temples and monuments of Greek art which were mutilated and destroyed by the former changes of the land, arising from eruptions and their concomitant earthquakes; but the chief point to which I wish to direct your notice is that the oldest eruption which has ever occurred on the site of this occasional vent of volcanic activity was on an infinitely grander and more colossal scale than any which have succeeded to it, and also

* The first of these rose in the year 197 before Christ, the second in A.D. 1573, and this has still the remains of an old crater. Another island appeared on the north-east coast of Santorino in 1650, but soon disappeared.

that each succeeding outbreak in this crater has been milder than its predecessors. These facts sustain a view which, as an old geologist, I have long entertained, namely, that the subterranean forces which anciently affected the surface and changed the outlines of the earth were of a more intense nature than those which now prevail. This view is countenanced in the region of extinct volcanoes of Asia Minor, and in the grand primeval outflows of Etna or the former activity of Vesuvius when its showers of pumice and ashes destroyed Pompeii. By comparing these with all subsequent outbursts of these several volcanoes, to say nothing of the volcanoes of Auvergne and the Rhine, which have been quiescent during the whole historic era, we see how the activity along visible vents of eruption has successively diminished.

The special interest, therefore, connected with the appearance of these new islets in the Ægean, is that they are miniature and feeble evolutions of the forces which were employed on a gigantic scale in those antehistoric periods when submarine deposits were raised into continents and vast tracts of land were submerged, in some cases by gradual operations working during countless long periods, in others, as I believe, by sudden and spasmodic elevations and subsidences. The geographer, antiquary, and geologist are all equally interested in studying these changes of the earth's outline; and hence it is that such a truly classic work as that of our associate Capt. Spratt on Crete, or the memoir on Santorino by Lieut. Leycester,* to which I have referred you, must be so highly prized by every one who is embarked in such studies.

In addition to the accounts of the last eruption in the Ægean Sea, as forwarded to us by the Earl of Clarendon, including the despatches of the Hon. E. H. Erskine, H.M. Minister at Athens, the description and drawings of M. Schmidt, a despatch of our associate Captain Brine, R.N., and others, the letter of M. Fouqué to the Eparch of Santorino, which was last received, is the most important to us as men of science. Sent thither by the French Academy of Sciences, and accompanied by a member of that body, my old associate M. de Verneuil, M. Fouqué has confirmed the view which I had already taken regarding the comparative feebleness of this eruption. Instead

* Lieut. Leycester wrote his sketch when serving under our accomplished associate, that sound naval surveyor Capt. Graves, of H.M.S. *Volage*; and the map to illustrate the paper is by Lieut. Mansell of that vessel. The subject of the recent eruption has been fully discussed by the French and Prussian geographers, and, doubtless, the full report of M. Fouqué, when published by the Academy of Sciences will be very instructive.

of being a cause of dread and fear to the inhabitants, this escape of the pent-up steam and sulphureous gases, through two small orifices and a fissure which unites them is, he justly considers, a safety-valve of great advantage to Santorino; and that a proper equilibrium being thus established between the volcanic materials beneath the surface of the earth and the atmosphere, the earthquake shocks to which the surrounding region is subject will be diminished. Following out the views of M. St. Claire Deville, M. Fouqué shows, that the intensity of volcanic eruptions is always to be measured by the nature of the materials and gases emitted; and judging from what he has collected at Neo Kaimeni, as compared with the emissions of Etna and Vesuvius, he places this recent event in the Ægean in the least active of his four phases of intensity of igneous action. Another important observation of M.M. Fouqué and De Verneuil, showing the very local character of this eruption, is that it has produced no change of level in the land of the adjacent islets of Mikro Kaimeni and Palæo Kaimeni, nor even on the northern part of Neo Kaimeni itself.*

It is right, however, to state, that in a despatch to the Earl of Clarendon, Mr. Consul Lloyd, who differs from some of the views of M. Fouqué, informs us, on the distinct authority of the Commander of a Prussian surveying vessel, that the channel between Neo Kaimeni and Palæo Kaimeni, which formerly had a depth of more than 100 fathoms in the deepest part, has now only a depth of 50 fathoms; and Mr. Lloyd further suggests that as the isle of Aphroessa is increasing, this depth will still more diminish near it, as well as in the waters near the George Promontory. All the phenomena have indeed been elaborately developed by a Greek Commission and Commander Palaska; whilst the best map representing the recent changes has been published by Petermann. As it had been a matter of doubt among some geologists whether flames ever issued from terrestrial volcanos, the well-ascertained fact of real scientific interest attached to the recent evolutions of Santorino is the proof they have afforded of the undoubted presence of flames, whether issuing from the crater or through the cracks and fissures in the newly raised scoriæ.

Switzerland.—Our excellent Corresponding Member Mr. J. M. Ziegler has this year sent me his usual report of the progress of the Swiss surveys, and with such fulness of interesting detail that it

* A translation of this interesting letter of M. Fouqué will be published in the 'Proceedings.'

would well deserve more space than I can give it in this Address. The great Federal topographical map was finished last year, and the Swiss Geodetical Commission is now taking an active part in the measurement of a meridional arc, entrusted to the International Geodetical Board by different Governments of the Continent. Another task of the Commission is the verification of heights, the determination of the elevation of the Pierre du Niton (Geneva), by successive levelling from Marseilles, having rendered it incumbent on their part to verify the difference of altitude between the Pierre Niton and the Chasseral, or determinating height of the Swiss survey.

The hypsometrical map of Switzerland, compiled by M. Ziegler, and published this year at Winterthur, is remarkable for the clear way in which heights are represented by tints, and gives the latest and most accurate view of the geography of Switzerland. It is accompanied by a treatise on the hypsometry of the country and orography of the Alps, in which the author gives a comparison of the mean depressions of valleys and mean altitudes of mountain-ridges, and which should be consulted by all who are interested in the physical geography of this country so fertile in subjects of scientific interest.*

Spain.—I cannot avoid allusion to a work published last year, under the authority of the Spanish Government, by Don Pedro Antonio de Mesa, giving a physical and hydrographical account of the basin of the Ebro. The author says that it is based on the same principles as the Memoir on the Guadalquivir already published, and he commences his work by a geographical description of the position and extent of the basin, being the most northern region of the peninsula, and having a maximum breadth of 270 kilomètres, and a maximum length from Peña Labra to the island of Buda of 520 kilomètres. It contains twelve out of the forty-seven provinces of Spain, with a superficies of 83,530 square kilomètres. It is divided into three portions, upper, middle, and lower, and contains four great secondary basins, corresponding with its four principal affluents, viz. the Jalon, the Aragon, the Gallégo, and the Ségre, the three latter of which descend from the Pyrenees.

* I am indebted also to Professor Paul Chaix of Geneva, another of our Honorary Corresponding Members, for some further details regarding the advances made towards a more accurate knowledge of the physical geography of Switzerland and the neighbouring countries, some of which are of geological rather than of geographical interest. He informs me that M. Dausse, in a contribution to the Helvetic Society of Naturalists, on the past and present state of the lakes of Lombardy, admits that some of these lakes were formerly united in one large basin, including the present lakes of Varese, Lugano, Orto, and Lago Maggiore, discharging its water through the south end of the lake of Orta, and the valley of the river Agegna.

In this elaborate work the author describes, further, all the affluents of secondary and even third-rate importance, gives a detailed account, accompanied by many cross sections, of the different regions through which the river flows, and the various ways in which the water is utilised, concluding by describing the great canal and irrigation works now projected, or in course of construction, in the lower course of the Ebro. Other minor works and canals are carefully detailed, and the author endeavours to show the capacity of the different rivers, together with the best means of applying the water supply to the various wants of the province, and the proportion in which it should be done.

ASIA.—*Researches of Russian Geographers.*—Through the kindness of M. F. Osten Sacken, the Secretary of the Imperial Geographical Society, I learn that Prince Krapotkine made a journey in a mercantile caravan from Tsuruhailovietsk,* on the river Argun (S.E. of Nerchinsk), to the city of Merghen, in the province Heluntsiang of Chinese Tartary, and thence to Blagovestchensk on the Amur. This country was previously known only from hearsay and old Jesuit maps, and the author brings to our knowledge the new and interesting fact that in these interior lands, and 900 versts from the sea of Japan, there is a true volcanic tract, called Niun Kholdengi, in which a volcano was in activity in the last century, and minutely described by M. Wassilief, a celebrated Chinese scholar. Prince Krapotkine has gone far to settle the question by a survey of the country immediately surrounding the point of eruption, as he has there found basalts, lavas, &c. He was not, however, able to visit the old focus of eruption.

On the southern coast of Mandchuria, a region of which we have till lately been very ignorant, it appears from the researches of MM. Bendestchaff, Timroth, and Helmersen, that a profitable fishery in crabs, sand-eels, and sea-weed is carried on in the bay of Passiet; the sea-weed forming an article of food sent to Gherin and thence to China proper.

In Eastern Siberia the result of the examination of the river Vitim is looked to with great interest. In Central Asia and along the new line of the Russian boundary M. Struve has determined ten new astronomical points, among which are Tchemkend, Taschkend, Tchinaz, and the fort of Turkestan. Some of the corrections are considerable; for Taschkend is moved 37′ of latitude and 30′ of longitude to the S.E. from the position assigned to it in the last

* Zuruchaitui in English atlasses.

map of Central Asia, published by the Russian Topographical Depôt.

By recent intelligence from Russia, I learn that a Siberian expedition was in progress on the 21st March last, under the management of M. Lopatine, to explore and report upon the physical geography and productions of the region near the mouth of the Yenissei, where that large stream falls into the glacial ocean. Former travellers had not, it appeared, advanced beyond 72° N. lat., or to the isles of Broikow; but it has been said that large quantities of cod and other fish exist still further north. At those islands, the river, having a width of 60 versts, its rocky banks covered with soil, takes a north-westerly direction, whilst the hills, which it quits, range to the north-east. In its course northwards from Turukkansk, the Yenissei passes through those great and sterile flats so common in Northern Siberia, and known as the *Tundras* of the natives; and finally, when it enters the glacial sea, black rocks (supposed to be carboniferous) form its flanks. During the progress of this expedition the important discovery has been made of entire skeletons of mammoths, whose skin and hair have been preserved in frozen mud, like those of the specimen found many years ago near the mouth of the Lena, and long exhibited in the Museum at St. Petersburg. It is further stated that the heads of these extinct elephants were, for the most part, turned towards the south, as if the animals had been retreating southwards when caught either by an inundation proceeding from the North Polar region, or by a change of climate due to a wide elevation of land, their former pasture grounds being converted into the frozen soil in which the mammoths have been preserved to this day. If this account be substantiated, it offers new data for the reasoning of Geologists, who have hitherto had great difficulty in accounting for the prodigious quantities of mammoth tusks or ivory found in the Liakow Isles (New Siberia) in N. lat. 75°, as well as in Eschscholtz Bay, in Behring's Straits, without inferring that these remains had been transported from lands on the south and from the flanks of the Altai and Ural Mountains. But the preservation of so many entire animals of this size in such high northern latitudes induces me to modify somewhat the views I formerly entertained,* and to suggest that all northern Siberia, which is now so glacial, was, during the age in which the mammoth lived, a continent covered with a vegetation adequate to support vast herds of these huge animals, even up to 75° N. lat.

* See 'Russia in Europe, and the Ural Mountains,' vol. i. p. 492, *et seq.*

This view is, indeed, sustained by the researches which have been made from north to south; for, when we travel southwards, we find the mammoth remains becoming much scarcer, and, instead of whole animals, we meet with their broken and disjointed bones only, as if they had been transported from the north. Having satisfied myself by wide personal examination that other drifted materials, which proceeded from north to south, cover large regions of European Russia, Prussia, and Northern Germany (in many places superposed by those great erratic blocks which were conveyed in former icebergs), and seeing in our own islands similar evidences, I now infer that the chief masses of such *marine* drift were deposited whilst a prodigious change of climate was being effected over the northern hemisphere, large portions of which, like Northern Siberia, antecedent to such perturbations, were *low lands* indented by *marine estuaries*—whilst other countries, as Russia in Europe and Northern Germany, were then entirely under the sea. The simple fact alone of the absence of all northern drift, or of any erratic blocks over all Siberia, is, indeed, in direct contrast to the state of the surface of European Russia, Northern Germany, and the British Islands, and shows us, that when the great, and possibly sudden, change of climate occurred, by which the mammoths were destroyed and entombed *in situ*, Northern Siberia was largely inhabited by those animals.*

As respects Central Asia, I may state that, at a late monthly meeting of the Imperial Geographical Society of St. Petersburg, a remarkable memoir was read by Colonel Heinz, relating to the Mahometan people of Western China, called Dungans (Doungans in French), who are in actual revolt against the governing or Mandchu Imperial dynasty.

With the exception of the inhabitants of Chinese Turkestan, these Dungans, constituting, according to this author, a population of thirty millions, occupy in great numbers the provinces of Kan-si, Chem-si, Szechuan, and Yunnan and tracts north of the Thian Chan Mountains. From a residence, during the year 1865, among the Kirghis on the Russian frontier, Colonel Heinz obtained much curious information respecting these people and the origin of their quarrel with the Mandchu Tartars in the town of Si-ngang-fu. He is of opinion that the insurrection is too wide-spread and deeply rooted to be put down by the present feeble Government of China.

* See Lyell, 'Principles of Geology,' with citations from Pallas, Wrangell, Baer, and Middendorf, pp. 79 to 86.

In the discussion which followed the reading of this paper, differences of opinion were expressed as to the real number of Mahometans inhabiting China,—no one, however, placing it below twenty millions; whilst, on the whole, it seemed apparent that a religious element was at the bottom of an insurrection which has spread from the interior province of Chem-si or Shem-si towards the Russian frontier.

Considering the apathy of the Chinese Buddhist, and how a spurious and debased imitation of Christianity was rapidly propagated by the fanatical Taipings in other provinces, who can say that, if powerful leaders should arise, Islamism may not soon overspread a wide area of the Chinese Empire!

Region of Central Asia, between the Russian Frontiers and British India.—At our last anniversary, when I treated of the new frontier of Russia along the Khanat of Khokand, I directed your notice to the extensive and lofty region which lay between that line and Cashmir, the north-western advanced post of British India. Recently our attention has been called to a large portion of this almost unknown territory, in the great intermediate ocean of sterile mountains bearing the general name of "Pamir," an account of which was given to the Imperial Geographical Society of Russia by M. Veniukof, founded on a manuscript narrative of travels which was lodged in the Topographical archives of St. Petersburg in the year 1806.

After M. Veniukof's memoirs were translated, for our Society, from Russian into English, the quotations in them from the MS. narrative were found to contain so many anomalous and inexplicable statements, as well as mistakes of names, &c., that two of our best Oriental scholars, Lord Strangford and Sir H. Rawlinson, were induced to think that the Russian Government of that period had been imposed upon, and had purchased a made-up document not founded on true observations. Sir H. Rawlinson, indeed, gave us an elaborate criticism upon this narrative, purported to be written by Herr Ludwig von ————, an unknown German, who it was said, when employed by the India Company, went into the table-land of Pamir to purchase horses for the cavalry, accompanied by sepoys and a Lieutenant Harvey. Since this sterile country, as far as is known, contains small horses or mere ponies only, wholly unfitted for the use of cavalry, and as no record could be found of any such officer as Lieutenant Harvey, it was very natural that Sir H. Rawlinson, who had taken great pains to inquire into the facts, in the

desire to ascertain the truth, should have been led to throw serious doubts upon the narrative. On writing to my friend M. Khanikof, the accomplished Russian geographer, who has explored and described large portions of Persia and Central Asia, and who, two years and a half ago, wrote to me about this very Pamir land, I received from him an explanation, of which the following is the substance*:—M. Khanikof admits that certain inaccuracies in the narrative of the nameless German may have justified the doubts of Sir H. Rawlinson; but adds that in order to form a correct judgment our geographers must wait until they examine the original documents. For, besides the narrative, there are maps which, considering the period of their execution, are so very good as to have convinced the Russian geographers that they were laid down upon the spot, and after good astronomical observations. Now, those topographical works have never been seen out of the archives of St. Petersburg, and they constitute by far the most important part of the subject. The imperfect narrative must have been composed (M. Khanikof thinks) long after the survey was made, and by the person who brought the maps for sale to the Russian capital in the year 1806; it being further believed that the survey was made during the last twenty years of the last century, several substantial reasons for which are assigned. In showing that there is a mixture of truth with a good deal of inaccuracy (indeed Sir H. Rawlinson also had stated as much), M. Khanikof relies mainly on the authenticity of the map, and seeing its close approximation to accuracy in those conterminous tracts where observations have already been made, particularly along the course of the Syr Daria or Jaxartes, he is of opinion that the survey must have been faithfully made in the very region it illustrates.

Whether or not this explanation of M. Khanikof will prove satisfactory to our learned critics, I cannot but hope that we shall ere long obtain copies of the maps, which are, after all, the materials to interest us much more than the defective narrative.

Among the numerous desiderata which remain to be worked out by geographers—a long array of which I mentioned in the Address of last year—the great table-land of Pamir, as well as vast adjacent

* This letter will be published in our Proceedings. Whilst this sheet is passing through the press, I have received a second and much longer letter from M. Khanikof, who, having in the interval visited St. Petersburg, and carefully studied the narrative and maps of the unknown German, has discussed in detail nearly all the objections made by Sir H. Rawlinson, and has so far vindicated the general accuracy of the mysterious traveller. This letter will also be published in our Proceedings.—June 26th, 1866.

tracts of wild countries, still remain to be surveyed by topographers. For although Lieutenant Wood visited the source of the Oxus, and several others of our countrymen have explored adjacent tracts, still the old map in the possession of the Russians, as described by MM. Khanikof and Veniukof, must be viewed as a curious document. In the mean time I have only to hope that in the sequel British and Russian explorers may meet in this hitherto unknown territory to determine its exact physical features. Even granting that the map of the nameless German is found to be truthful in its broad outlines, the instruments used by geographers in the last century were comparatively defective. The valleys and uplands of Badakhshan and Pamir, lying to the north of the lofty Hindoo Kush, will therefore I trust, remain for ages to come the neutral ground between British India and Russia, in which the geographers of both countries may meet to promote the science which they cultivate, and much of the advancement of which in Central Asia is already due to the labours of our Northern allies.

Of another part of this wild region, concerning which we have heard little since a portion of it was described by the brothers Schlagintweit, we had an interesting account at our last meeting in the paper communicated by our medallist Captain Montgomerie. This is the country extending northwards from the Karakorum Pass to the city of Yarkand, in Chinese Turkestan, and through which flows the river Karagash as it descends from the Western Himalayas. This tract was explored and surveyed in 1863-4 by a native Moonshee, engaged by the Indian Government, furnished with proper instruments, and duly instructed by Captain Montgomerie, who was then directing the Great Trigonometrical Survey in Cashmir, Ladak, and the surrounding countries. Residing for some months at Yarkand, this envoy made many astronomical observations which determined the position of the city to be 38° 20′ N. lat. and 77° 30′ E. long.; thus showing certain differences between his results and the estimates of the French Jesuits on the one hand, and of the Schlagintweits on the other. The altitude of Yarkand was ascertained to be about 4000 feet above the sea-level, and the climate in winter to be so severe, that the thermometer, early in January, sank nearly to zero. We also learn from this native traveller (who unfortunately died on his return just after he crossed the mountains into country under British protection) that the precious stone called jade (the Nephrite of mineralogists) occurs in some quantity on the banks of the Karagash.

Now, as this mineral is also found in that part of Eastern Siberia watered by a great affluent of the Amur, whence the large block of it in the British Museum was brought by M. Alibert, we know that this stone, so prized in China, occurs at intervals through a wide space of Central Asia.

On this occasion Captain Montgomerie gave us a vivid picture of the grandeur of these mountain ranges, so large a portion of which has now been accurately laid down by the Great Trigonometrical Survey. The journey of the Moonshee has enabled him to ascertain that from Jummoo, or any point in the Punjab at the foot of the Himalayas, it takes a man, assisted by a pony, sixty-six days to cross the mountains, and during that period the road lies for twenty-five days over country never lower than 15,000 feet, and for forty-five days never below 9000 feet above the sea-level. The elevated ranges may therefore be said to be at least 400 miles across at their smallest breadth. During the years which the Survey has been directed in these regions by Capt. Montgomerie, he has informed us that the whole of the Karakorum and Mustakh range has been defined, forming the boundary between Little Thibet and Turkestan; and that the altitude of the peaks for 450 miles varies from 21,000 to 28,300 feet, a very much higher range than that of the Himalayas to the south of Ladak and Little Thibet.

The description given by Capt. Montgomerie of the appalling difficulties overcome by the surveyors under his direction, when they explored this lofty chain, made a profound impression on all who heard him, and we have only to hope that our Medallist and his gifted associate Capt. Godwin-Austen will ere long make known to us the true physical geography of the vast region which lies between the sources of the Indus and those of the Brahmaputra.

Before we quit the consideration of these lofty mountains in Asia, I must particularly advert to the last number published of the splendidly illustrated fasciculi in folio, prepared by the brothers Hermann and Robert von Schlagintweit. Besides the meteorological data communicated both in the letter-press and in instructive tables and diagrams, the sketches, printed in oil-colours, are most striking and effective; particularly those which represent the great snowy chain of the Kuen Lun in the distance, from Sumgal in Turkestan, and the Salt Lakes of Tsomoriri and Tsomognalari in Western Thibet.

*Great Trigonometrical and Topographical Survey of India.**—The great

* Abridged from a memorandum by Colonel Thuillier.

triangulation of Hindostan has extended now over at least three-fourths of the entire area of that country, fixing the true positions of all the chief cities, towns, and places of importance. One of the blanks to be filled up is in Eastern Bengal and Assam, comprising the whole of the lower provinces east of the meridian of Calcutta. The extension of the great longitudinal series of triangles from Kurrachee in Sindh to Calcutta, is now being carried eastwards along the parallel of 23° N. lat. to the extremity of the British frontier, to tie another meridional series progressing southwards from the Cossyah mountains, in about 92° E. long., down the frontier towards Arracan and Rangoon; and the point of junction has been effected just below the British station of Tipperah or Comillah. This quadrilateral, which embraces all Bengal Proper east of the meridian of Calcutta (with the exception of a portion of the Brahmaputra River and Upper Assam, which will be separately provided for), will require an intermediate series of principal triangles to fix the city of Dacca and other places of importance in Eastern Bengal on the meridian of 90° E. long.

The northern longitudinal series, from the Sonakhoda or Darjeeling Plains base, up the valley of the Brahmaputra River, is completed as far as Gowhatty in Assam, and it will hereafter be continued in a north-easterly direction to the extreme limits of the British frontier on the borders of Thibet and Burmah.

The remaining work to be done by the trigonometrical operations lies in Central and Southern India, and on the Coromandel coast, below the parallel of 23° N. lat. A principal series has long been in progress along the coast from Calcutta towards Madras, which place it has nearly reached. Another base of verification has lately been measured at Vizagapatam.

Between the coast and the great arc series, on 78° E. long., a large tract of difficult and but little known country has to be taken up. This large ellipsoidal figure, comprising Berar, Gondwana, the Jungle-Mehals, Sirgoojah, Sumbhulpoor, the Khond country, Goomsur, &c., perhaps some of the most unhealthy parts of India, is now being provided for by meridional series of principal triangulation, extending southwards from the great longitudinal section, on the meridians of 80°, 82°, and 84° E. long. These will be tied by another cross longitudinal section from the Vizagapatam base to the Beder base, on the parallel of 18° N. lat., and so across the peninsula to Bombay, in the vicinity of which another base will have to be measured, and which will complete two more grand quadrilaterals

(verified by six bases*) of about equal areas to the northern ones.

The whole of the southern peninsula below the parallel of 18° has been covered by a network of triangulation, performed many years ago, with less pretension to the scientific accuracy of the later operations, and with inferior instruments. To perfect the great work according to the system of modern refinement pursued for some years past, the Coromandel coast principal series will have to be prolonged from Madras to Cape Comorin and Ceylon, with a cross section from Madras to Bangalore and Mangalore, in 13° N. lat., and a fresh series on the meridian of Mangalore, in 75° E. long. This will divide the southern peninsula into four remaining smaller quadrilaterals, which will be checked by additional base-lines, to be laid down at Bangalore, at Cape Comorin, and at Mangalore on the western coast. An independent base will likewise have to be measured at Rangoon, to check the very long meridional series which will connect Pegu and the Tenasserim provinces on the eastern coast with eastern Bengal. A chart of all the existing and proposed triangulation has been deposited in the library of the Society.

On the rigorous basis of triangulation adopted, which is carried out with the largest instruments and all the refinement due to geodesical operations of the first order, the topography of an enormous area has already been laid down. Those portions of India which are exclusively British possessions, and fall within the regular assessment of the land revenue, are delineated on the 4-inch scale. This is reduced and published on the 1-inch scale, and further reduced for incorporation into the General Atlas of India, published in England on copper on the ½-inch scale. The native independent, or tributary states or possessions, are surveyed on the 1-inch scale only, the standard scale for all general maps, and which is sufficient for military or government purposes, and where no revenue is derived from the land.

Assam, Upper and Lower, now growing into great commercial importance, remains to be taken up, and will be immediately entered upon, with the view to a regular settlement of the country, and the definition of the numerous tea plantations and grants of waste lands

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* Calcutta .. .. } Coast.
Vizagapatam .. .. .. }
Beder .. .. } 78°
Sironj .. .. }
Bombay .. .. } Coast.
Kurrachee .. .. .. }

made under the fee simple rules. The territory recently ceded by Bhootan, and now known by the name of the Bengal Dooars, is now occupied by the surveyors, who are defining the northern line of frontier. A preliminary sketch map of this tract of country, which is most unhealthy and difficult of access, has been brought out for the guidance of the troops employed, but owing to the great jealousy of the Bhooteas, our previous knowledge of it was exceedingly meagre.

When we consider the enormous extent of British India, and its proportion to the area of the British Islands, the relative periods occupied on the two great national surveys, it cannot be wondered at that there is still a great deal to be done in the former country, where the first commencement was made during the earliest part of the present century. Fresh conquests of late years have added areas larger than our own islands, all requiring to be provided for, before even the older provinces could be got through. As an instance, it may be mentioned that the Nagpore and Nerbudda districts in Central India, recently formed into a separate agency or chief commissionership, under the designation of the Central Provinces, aggregate an area of very nearly 115,000 square miles, about equal to the whole of the British Islands.

The same staff that served with Captain Montgomerie, in the arduous survey already alluded to of the mountainous northern frontier, are now employed in extending the topographical survey of the Himalayas in British Ghurwal and Kumaon, eastwards as far as the Nipal frontier, where it is feared these most interesting operations must come to a stoppage, unless the inherent jealousy of the Nipalese can be overcome in the interests of science, which is more than doubtful.

The northern portion of the Punjab (comprising Hazara, Jhelum, and Rawul Pindi, districts subtending the Indus River, which are all of a very intricate and hilly character) has been laid down in a very masterly manner, and the 1-inch lithographed sheets are perhaps as fine specimens of the delineation of difficult ground and topographical drawing as can be met with in any country.

The Native States of Rajpootana in Central India, the Tributary Gurjat States of Orissa with Bustar, Chinna-Kimedy, &c., the South-west Frontier Agency in Chota-Nagpore, the Godavery Talooks and assigned Districts of East and West Berar, ceded by the Nizam of Hydrabad, together with Pegu, are all now in good progress, and being prosecuted as rapidly as local circumstances will allow; but

an enormous area in these several localities still remains to try the endurance and ingenuity of the surveyors.

The Nizam's dominions of Hyderabad have just been completed, and the whole of the Madras or Southern Peninsula was depicted many years ago by the Madras Military Institution surveyors on the 1-inch scale. On this survey those sheets of the Indian Atlas were published. With the lapse of time, change of appearance of the country, the introduction of roads, railways, &c., and the enhanced value of the land, a second survey became a necessity, and this now in progress, will, it is hoped, be the means of enabling the Geographer for India to supersede all the old sheets, which may be more or less obsolete, with new ones.

Of the Bombay Presidency there is a great want of good topographical maps, especially of the northern portion, about Baroda, Surat, Ahmedabad, Goozrat, and Cutch. The regular survey in this Presidency was unfortunately stopped several years ago, and until very lately it has never been carried on again. For the sake of the Atlas of India it is to be hoped that nothing may again interrupt the regular course of the operations.

The Indian Atlas comprises, according to the Index Map issued under the authority of the late Court of Directors of the East India Company, 177 proposed sheets or sections. Each sheet measures $40\frac{1}{2}$ by $27\frac{1}{2}$ inches, or nearly $2\frac{1}{4}$ degrees of longitude, and $1\frac{1}{4}$ degree of latitude, and embraces an area of 17,824 square miles, and is engraved in England on the $\frac{1}{4}$-inch scale. Of these sheets, up to the present date, $78\frac{1}{4}$ sheets have been published.

Printed progress reports illustrative of the whole of the operations in India up to the present season, and Index Maps, showing the state of the Atlas, have been deposited in the Society's library by the Surveyor-General of India, together with copies of such miscellaneous and general maps, lithographed in Calcutta, in anticipation of the publication of the engraved sheets of the Atlas as were deemed likely to be useful and interesting.

Chinchona Cultivation in British India.—In a previous Address I dwelt upon the valuable service rendered to the natives, colonists, and soldiers of our great Indian possessions by the labours of our accomplished Secretary and enterprising traveller, Mr. Clements Markham, who was the first to introduce the cultivation of the best species of Chinchona-plants, collected in the Andes of Peru and Ecuador, into India. As the Secretary of State for India deemed it to be essential to ascertain the progress made in the

growth of these plants in their new habitats, he sent Mr. Markham last winter to make the inquiry, and in consequence the public are now furnished with a clear and most satisfactory Report, which I consider to be one of great national importance.

Chinchona cultivation was introduced into India in 1861, by Mr. Markham,* and already, in February of this year, there were 984,143 plants flourishing in the Government plantations on the Neilgherry hills alone; while the cultivation had been undertaken by numerous planters and private companies. The tallest trees were found to have reached the height of 17 feet, and an unlimited supply of seeds will have been obtained from them this year. The Government plantations on the Neilgherries, when completed, will cover 2200 acres. There are other Chinchona plantations in Ceylon, at Darjeeling, at Kangra in the Punjab, and at Mahabaleshwur, near Bombay.

Two of the measures necessary for the success of this great undertaking have been crowned with complete success, namely, the introduction of the most valuable species of Chinchonæ from the South American forests into India, and their conversion from wild into cultivated plants. The latter measure has been so successful that, whereas the largest yield of febrifuge alkaloids in Peruvian bark imported from South America is from 3 to 5 per cent., the bark grown in India, though only three years old, has already given the unprecedented result of 11 per cent.! This remarkable success in the cultivation is mainly due, as Mr. Markham tells us, to the great skill and ability of Mr. McIvor, Superintendent of the plantations, who was elected a Fellow of the Royal Geographical Society during the present session.†

The points which remained for decision, connected with the Chinchona enterprise, were the best means of utilising the bark with a view to the spread of its beneficial effects amongst the millions who suffer from fever in India, and who cannot afford to buy quinine at 20*s*. per oz.; and the extension of the cultivation to as many different districts as possible.

Mr. Markham was called upon specially to report upon these

* The Secretary for India who employed Mr. Markham to collect the plants in Peru and transport them to India, was Lord Stanley; and it was his successor, Sir Charles Wood, now Viscount Halifax, who sent him to examine and report upon the progress made since the transplantation took place.

† I may add that Dr. Cleghorn, Conservator of the Madras Forests, and who accompanied Mr. Markham in Southern India, has also become a Fellow of this Society. Dr. Cleghorn is, I am told, one of the few men who have penetrated into the Anamallay mountains, and explored their almost unknown plateaux and forest-covered slopes.

points. Now, with regard to the first of them, he has tried several experiments with the bark on the Neilgherries, and has strongly urged the establishment of manufactories for the production of the febrifuge in so cheap, and at the same time so efficacious, a form, as to place it within the reach of the poorest ryot in India and his family. He has also recommended the employment of an eminent Dutch chemist, Dr. de Vry, as chemical reporter on the Peruvian barks grown in India. As to the second point, he explored the little-known hills of Travancore, examined the capabilities of the Pulney hills, of the wild and beautiful Koondah range, and of the coffee district of Wynaad. He went over the Travancore hills, through dense forests and over plains covered with elephant-grass 10 feet high, on foot; crossing the great river Perryaur on a rude bamboo-raft. The result of these journeys has been that he has succeeded in promoting the cultivation of Chinchona-plants in the Travancore State, on the Pulney hills, and by numerous planters in Wynaad.

Mr. Markham's great object is to see Chinchona-trees growing near each hut, in every village in the hill districts; so that the cure for the terrible scourge which now decimates the people may be at their doors, and that a decoction of Peruvian bark, at least, may be immediately procurable when the feverish season comes on. Although, in his highly satisfactory Report, Mr. Markham has not touched on the commercial aspect of the question, he thinks that Chinchona-bark will ere long form an important item in the list of Indian exports, and be another source of wealth to our Eastern Empire. In the mean time, I entirely agree with my sagacious friend Mr. John Crawfurd, whose authority on Indian affairs stands so high, that the thanks of the country are due to Mr. Markham for the great and beneficent achievement of the naturalization of Peruvian bark in India.*

Japan.—Although the coasts of the Japanese archipelago have been in part well laid down both by native Japanese cartographers and our own naval surveyors, our knowledge is still very scanty regarding the varied interior of these islands; it was therefore with great satisfaction that I listened to a paper by Commander Forbes, at our last meeting, describing two excursions which he had recently made into the interior of Yesso. Besides a sketch of the volcanic district on the shores of this island, and especially along the western side of

* See the 'Examiner,' May 12th, 1866. Sir W. Denison, the able ex-Governor of Madras, has also expressed this opinion. See 'Proceedings,' 11th June.

Volcano Bay, he gave us an interesting account of the Ainos, or race of hairy people, who still occupy the whole of the interior, and whose appearance and habits he had opportunities of observing. In the discussion which followed the reading of this paper, Professor Huxley gave us a most clear and striking account of the peculiarities of a skull of this curious people which Commander Forbes had brought home, and showed that, in its elongated shape, it differed essentially from the round forms of the Mongolian and other nations of Eastern Continental Asia, and showed affinities with the Esquimaux type. It is a singular circumstance that the Japanese offer the same peculiarity in form of skull, and Professor Huxley attributed this to their having commingled with the Ainos during past centuries.

AUSTRALIA.—In the general sketch of the progress of discovery and colonisation in the great British Terra Australis which I presented to you last year, little was said of the existing state of Queensland, for in truth such important advances were then being made, under the enlightened government of Sir G. Bowen, that I deferred enlarging upon the subject until the whole of the materials were before me.

Measured from its southern boundary, near Brisbane, the capital, to Cape York, the extreme northern point of the continent, the colony of Queensland has a length of 1100 geographical miles, and an average width of not less than 500 miles.

The region around Brisbane, formerly the Moreton Bay Settlement of New South Wales, had long been known as a healthful and thriving tract, but, in the absence of experience, few persons had anticipated that the greater part of the lands lying to the north of it, and ranging into inter-tropical latitudes, would be found suitable for Europeans, and still less that such lands would prove to be highly profitable grazing-grounds, where sheep as well as cattle could thrive and multiply, even up to 18° south of the equator. We have no longer to speculate upon hypotheses, and I have only to use the emphatic language of Sir George Bowen, when he last addressed the House of Assembly of that colony, to bring to your mind's eye what the rapid and at the same time solid progress of this colony has been:—

"Since the establishment of Queensland, in December, 1859," says the Governor, "our European population has increased from less than 25,000 to nearly 90,000;—that is, it has been augmented nearly fourfold; while our revenue, and our trade (including

imports and exports) have been more than trebled. The other chief elements of material prosperity have advanced in almost equal proportion. During the same short period, cotton, sugar, and tobacco have been added to our list of staple products; a line of new ports has been opened along our eastern seaboard from Keppel Bay to Cape York—a distance of a thousand miles; while pastoral occupation has spread over an additional area, at least four times larger than the area of the United Kingdom. In 1859, our settlers had hardly advanced beyond the Darling Downs to the west, or beyond Rockhampton to the north. Now, in 1865, there are stations seven hundred miles to the west of Brisbane, and eight hundred miles to the north of Rockhampton. These facts, derived from the official statistics, cannot fail to be interesting and instructive to our fellow-countrymen at home: while they must be to you, as they are to me, a subject of honest pride, and of devout thankfulness."

The progress of discovery in the unexplored tracts of this prosperous colony has been so rapid of late years, that it is difficult to keep pace with the strides which have been made. Amongst the most important of the expeditions which have led to the increase of our knowledge of the country, I may particularly mention that of the Messrs. Jardine, who in endeavouring to open up a route for the transport of cattle from the pastoral districts of Southern Queensland to the new settlement at Cape York, traversed the whole of the previously unknown western portion of the great North-Eastern Peninsula of Australia. The journey of Mr. J. G. Macdonald must also be recorded as one of the remarkable events in the progress of discovery in this part of the continent; this traveller having, in the latter part of 1864, crossed from Port Denison to the Albert and Nicholson Rivers, and returned by nearly the same route, after exploring a large extent of new country. The narratives of both these expeditions will be published in the next volume of our Journal; and I may also refer you to the volume recently published for an account of another successful exploration which seems likely to lead to results of great practical importance: I mean the discovery by Mr. J. E. Dalrymple of a route between Rockingham Bay, over the precipitous coast range, and the pastoral country of the Valley of Lagoons, by which the produce of the extensive table-lands of the interior will find an easy outlet to the seaboard. The journal of Mr. Dalrymple, already known for his previous geographical exploits in Northern Queens-

land, in company with Mr. A. J. Scott,* gives a vivid picture of the physical features of the Rockingham Bay District.

In sending home an able memorandum, prepared at his request by Mr. W. E. Lamb, respecting the last settled country at the head of the Gulf of Carpentaria, Sir George Bowen adverts to its details as proving the unprecedented rapidity with which pastoral occupation has advanced in northern Queensland during the last few years, thus giving a distinct contradiction to those persons who, judging from the condition of countries on similar parallels north of the equator, had inferred that sheep never could flourish or produce valuable wool in such inter-tropical latitudes. On former occasions I have endeavoured to check this incredulity by reference to what I considered to be good evidences of the capability of successful sheep-farming as derived from the experience of Landsborough and M'Kinlay, and, indeed, from all the bold explorers who understand the subject. We are now told by the Governor, that sheep-farming has spread, within the last four years, over an additional area equal to that of France, and that sheep are now successfully depastured as far north as 18° s. lat., both at the head of the Gulf of Carpentaria, and also towards the eastern seaboard of the colony, upon the elevated plateau above Cardwell, the new township in Rockingham Bay, named after the vigilant Minister of the Colonies. And here it must be recollected that a large portion of this northern territory of Queensland consists of basaltic table-lands, having an altitude of from 1000 to 3000 feet above the sea, and therefore enjoying, during several months of the year, a comparatively cool climate. Indeed, Sir George Bowen estimates that at this time (January 1866) there are feeding in the extreme northern pastoral district of Burke alone (full accounts of which have recently been given in our 'Proceedings') at least 110,000 sheep and 12,000 head of horned cattle. At the new Port of Burketown, on the River Albert, there were some 300 inhabitants when he wrote (Jan. 18th), destined, doubtless, to be the founders of a great mart of commerce, and an entrepôt between our Indian and the mass of our Australian settlements, through the grand indentation of the Gulf of Carpentaria, which penetrates 500 miles into the continent. Again, at the eastern point of this grand bay, the new settlement of Somerset, near Cape York, in 11° s. lat., so well described in our 'Proceedings' by Mr. John Jardine, has been a complete success; and the Europeans who have now been there for

* See 'Proceedings,' vol. viii. p. 110.

nearly two years, find the climate so agreeable and healthy that Mr. Jardine is of opinion that it may become a sanatorium for invalids from our establishments in India and China. The new port is already much resorted to by ships passing through Torres Straits, and hence there is every prospect that Cape York may one day be to Australia what Singapore is to our Indian Empire and the great Eastern Archipelago.

But to return to the consideration of the great region lying immediately to the south of the Gulf of Carpentaria. We now have in the report of the Crown Commissioner, and on the authority of Sir G. Bowen, the most reliable evidence that this country is eminently adapted for stock of all sorts. Besides the richest grasses, there are many plants on which sheep and oxen thrive, such as "salt-bush" and "native leeks, carrots, and cucumbers;" whilst it is believed that in no part of the region to the north of the 19th or 20th degree of latitude do those droughts prevail, which have proved so prejudicial in other and more southern portions of the mainland of Australia. With nights invariably cool, and with much moisture retained in wooded and richly-grassed extensive plateau lands, the heat is necessarily modified; the average temperature in lat. 20° being 74° Fahr. There can indeed be no difficulty, as I have said in former addresses, in explaining why the isothermal lines of Northern Australia should differ much from those which pass from east to west in similar latitudes to the north of the Equator, where no such terrestrial conditions exist, and where rocky and sandy soils, in great part, at no great elevation above the sea form a peninsula in the midst of a hot Indian ocean. This evidence exists indeed in Australia itself, for the new settlement of Somerset at Cape York, in 11° s. lat., jutting out into a warm sea, is just as unsuitable for sheep as the same parallel N. of the Equator in southern India.

To satisfy you as to the wonderful progress of these newly inhabited parts of Queensland, I may refer you to the February number of our 'Proceedings,' in which we learn from Mr. Landsborough that Bowen, the town of Port Denison which arose in 1861, had reached in four years a population of 1000 persons, and that Rockhampton, on the Fitzroy River, had risen in eight years to a population of 5000 to 6000 inhabitants.

When, however, we turn from Queensland, that highly flourishing north-eastern colony of Australia, and look to the results of the efforts which have been made to found settlements on the northern

coast, I am compelled to acknowledge that there is little or nothing to encourage the hope that the extreme northern shores of that coast will ever be found to be suited for the colonisation of European settlers. Indeed, I never anticipated a successful result from the bold endeavours made by the South Australians to form a settlement at the ultimate point of the explorations of McDouall Stuart, which terminated in a seaboard of low altitude, and within 12° of the Equator. I was, therefore, quite prepared to learn that such an enterprise would prove a failure, which I fear it is, if I rightly judge from the lively and well-written description of Mr. Stow, who, with his companions, faced and surmounted all the dangers of an open-boat voyage of 1600 miles along the whole of the northern coast, to escape from that port and reach the settled colonies on the West, rather than remain in so ill-selected a spot.*

From that narrative we also learn that, considering the numberless reefs and islets which stud that northern shore, and the vast low swamps and jungles extending over a considerable portion of the mainland, no one can anticipate the successful formation of British settlements. Even when the explorers in their bold boat-voyage reached Camden Bay, already a settlement, and with a certain amount of elevated and high land behind it, they found much distress among the settlers, and sheep perishing from the heat of the climate.

Although these discouraging accounts have been received from the new settlement in the northern territory, it must be recorded, in justice to the Government of South Australia, that they have now taken all the necessary steps to ensure a complete survey of the country around Adam Bay, and learn its capabilities. In September last, as I am informed by our associate Mr. F. S. Dutton, an expedition was despatched, under the command of the well-known explorer McKinlay, with forty horses and a suitable complement of thorough bushmen, and with instructions to explore the whole country south of Adam Bay, between the Victoria River and the Gulf of Carpentaria. Since then a map has been received of the Adam Bay district, in which, on a scale of 1 inch to 2 miles, the nature of the country is laid down, as surveyed by Messrs. Auld and Litchfield, Government Surveyors.

I must here, however, remind my associates that the only locality which I have for many years advocated, as by far the best adapted for any settlement approaching to the northern shores, has been overlooked in all the last efforts to form such settlements. That which

* 'Proceedings,' Feb. 20, 1866.

the extensive Gulf of Carpentaria effects upon a large scale, by forming a southern indentation into the Australian Continent for 500 miles, is effected on a smaller scale by the more circumscribed Cambridge Gulf, especially towards the south-eastern extremity, or the Queen's Channel. There, in a sheltered position, with fine adjacent plateau lands, an abundant vegetation, and at the mouth of the northern River Victoria, Mr. A. Gregory planted a station in the year 1859, and thence he made his famous journey across to the present Queensland. Mr. Wilson, who was left in charge of the Camp, and who remained there for ten months, gave us a most satisfactory account of the climate and productions of the district. When we reflect that this locality is at least three degrees of latitude further removed from the Equator and the Indian Ocean than the new settlement of the South Australians at the mouth of the Adelaide River, and is backed by lofty and productive lands, we may reasonably anticipate that, with the extension of colonisation westward from the shores of the Gulf of Carpentaria, the time is not distant when the fine deep bays at the head of Cambridge Gulf will also, like the Gulf of Carpentaria, become the resorts of British commerce. Again, such land-locked waters, midway along the northern shore, and contrasting strongly with the exposed flats of Adam Bay Settlement, will serve as harbours of refuge for our mercantile marine, and be, as I urged when occupying this chair many years ago, of real service to the nation in case of a maritime war as a station for fleets destined to protect our Eastern commerce. I now, therefore, renew the gratification I experienced in the year 1857, when I heard the then Minister of Her Majesty's Colonies, now Lord Taunton, say, on receiving our Founder's medal for Mr. Gregory, that after the description of the soil and climate at the mouth of the Victoria, "it was no extravagant supposition that some of us may live to hear of that hitherto unknown region becoming the home of a prosperous British settlement." Such I am persuaded would already have been the issue, if the colonists of South Australia had chosen the Queen's Channel of the Cambridge Gulf as the seat of their bold enterprise, instead of the extreme northern and exposed situation of Adam Bay, to which McDouall Stuart had so boldly advanced.*

* Since this address was read, and whilst these pages are being prepared for the press, I learn that the distinguished Australian surveyor John McDouall Stuart died on the 5th of June, at Notting-hill. I have in former Addresses so highly eulogised the labours of this adventurous explorer, that I may refer my readers to them as a record of his successful career as a traveller, and as a tribute to his memory.

I cannot quit the subject of Australia without again alluding to the laudable and strenuous exertions which the inhabitants, and particularly the ladies of Victoria, led on by our gifted associate Dr. Mueller, have been and are making to discover the line of Leichhardt's route in the interior. If this effort has not the good fortune to save any one of his party who may have survived, it may at all events determine the fate of the great explorer. Animated by the example of the ladies of Australia, and seeing that the Colonial Legislatures of Victoria, South Australia and Queensland had subscribed 1500*l.* towards this expedition, which must assuredly have important geographical as well as pastoral results, I had much pleasure in proposing that our Council should grant 200*l.* towards this object. It was, indeed, most gratifying to me to know that the Queen headed this subscription with a donation of 100*l.*, whilst Mr. Cardwell, Her Majesty's Minister of the Colonies, handsomely united with us in augmenting the fund. The very announcement of this subscription will, I hope, convince the Australian colonists of the deep interest which is taken in their welfare by their Sovereign and the mother country. Unhappily, the unprecedented drought of the past season was fatal to most of the horses of the expedition under Mr. McIntyre;* but we may rest assured that Dr. Mueller and his associates will be reinvigorated in their spirited exertions, by the proofs of the interest taken in the successful issue of this stirring enterprise by their Sovereign and their friends in England.

SOUTH AMERICA.—The exploration of the River Purus, one of the most important branches of the Amazons, for nearly 1900 miles, and the determination, for the first time, of its true course throughout that long distance by a series of astronomical observations by Mr. Chandless, for which the Council has conferred upon him the Patron's Medal, was undertaken voluntarily, and at his own expense, with the object of determining a question not only of great geographical interest, but of the first importance to the inhabitants of the countries situated between the Eastern slopes of the Andes and the Amazons; namely, whether or not a direct communication exists which may be made available by this river, as has been long supposed, between those countries and the Atlantic.

All we knew till recently of the Purus was, that it is a river of the first magnitude, discharging itself into the Amazons by four

* By the last account the expedition had reached a well-watered country, and were proceeding steadily to the west.

mouths, one of which is described as more than half a mile in width, and 18 or 20 fathoms in depth at a mile from its mouth, and supposed to have its origin at no great distance from Cuzco in Peru, where the greatest want of the inhabitants is such a means of intercommunication with the rest of the world, and an outlet for their valuable products and mineral wealth without the enormous cost and difficulty of transporting them over the Andes for shipment; but neither under the Governments of the Sovereigns of Spain or Portugal, nor their successors, has any one been known to have descended the Purus from Peru, to verify its capabilities. Fear of the savage tribes who live upon its upper affluents has hitherto effectually barred their examination.

The general course of the river, as shown upon our maps, was originally laid down from information collected from the Indians in the time of the Spanish rule by the missionaries, whose well-known labours in these regions entitle them to all praise. The best delineation of it, upon their authority, is that given in the great map of South America by Don Juan de la Cruz, in which it appears as originating near the mountain ranges of Paucartambo, and at no great distance from Cuzco; and this was corroborated by later accounts, and especially by those obtained by Don Taddeo Haënke at the close of the last century, whilst exploring the Beni and other affluents of the great river Madeira, as may be seen in his interesting memoir upon those rivers in the fifth volume of our Journal.

We knew little more of the Purus till our indefatigable Secretary Mr. Markham, in the course of his travels in the department of Cuzco, undertook a journey from Paucartambo with the express object of determining, if possible, its true sources. Following the course of the Tono, he penetrated the dense forest through which it runs, and after a tedious and difficult passage reached a hill from which he obtained a view of a great river running eastward, which, from all the accounts given him, he felt satisfied could be no other than the Purus. He described it as a mighty stream, there called the Madre de Dios, or Amaru-mayu, and said to be increased, 100 miles beyond, by two great rivers, the Araza or Maracapata, and the Ynamberi. The point where he saw it he fixed in lat. 12° 45′, long. about 70° 30′ w. There was, no doubt, ample ground for such a belief, but it must be admitted there was no certainty regarding the information so collected. No one had ever been down those rivers, and the only point positively determined was the position of a mighty stream, where Mr. Markham saw it, running in the direction of the

reported course of the Purus, which it was supposed, from all accounts, would be found to be the main source of that river.

In the mean time, however, the same uncertainty no longer existed with regard to the lower parts of the Purus, which had become more or less known from its being resorted to at certain seasons by traders from the Amazons in quest of turtle, and the sarsaparilla, copaiva, and India-rubber found in the forests through which it flows. Their reports of the possibility of ascending it for several hundred miles induced the Brazilian Government to send exploring parties up it, in the hope of opening a communication between its higher waters and the Bolivian settlements above the falls of the Madeira; but those expeditions led to no other results than to confirm the previous report of there being no serious impediment to the ascent of the river for upwards of 1200 miles.

Mr. Spruce, who has passed so many years in the regions bordering on the Amazons, obtained the diary of the commander of one of these expeditions, one Serafim Salgado, which he translated as a note to Mr. Markham's 'Cieza de Leon,' a volume printed for the Hakluyt Society. It took that party four months in two canoes to reach the mouth of the River Aquiry, the principal affluent of the Purus from the south, near which they were met by a party of the Canamary Indians, whom Serafim describes as cannibals, preparing to kill and rob them. This imaginary danger escaped, they proceeded some days higher up the river, when Serafim says it was impossible to go on, the river having become so narrow and obstructed that it did not admit of the passage of even the smallest canoe.

Mr. Chandless (who could not have seen Serafim's paper) has shown both these statements to be singularly incorrect. He describes the Canamarys as the most honest and civil of all the Indian tribes he fell in with; and as to the navigation beyond being impossible, he went up the river 600 miles further, sufficiently proving how little such information is to be trusted.

Mr. Chandless's diary of his own Expedition, which was read at the meeting of the Society on the 26th of February, will appear in the next volume of our Journal. The result will disappoint the hopes entertained of this river being available as an outlet for the produce of the eastern provinces of Peru. It sets at rest also all question as to the Madre de Dios being the Purus, Mr. Chandless having traced the latter throughout its long and tortuous course, for nearly 1900 miles, to its origin in insignificant streams, *two degrees to the north of the Madre de Dios*, where seen by Mr. Markham.

The question for us geographers then arises, What becomes of the Madre de Dios? Mr. Chandless inclines to think it may be one of the sources of the *Beni* which falls into the Madeira; if so, may it not be the Tuchi, described by Haënke (in the paper I have previously alluded to) as the farthest west of the affluents of the Beni, and laid down on the map accompanying his paper as joining the Beni in nearly the same parallel in which the Madre de Dios was seen by Mr. Markham running eastward. Moreover, I find, upon reference to De la Cruz's map, that the *Amaru-mayu*, which Mr. Markham gives as one of the names of the Madre de Dios, really does appear as one of the names of the *Beni* in that map. (See also D'Anville, whom De la Cruz quotes as an authority.)

On the other hand, the *Ynamberi*, which Mr. Markham was told fell into the Madre de Dios below where he saw it, is shown on the same map to run in a north-easterly, instead of westerly direction, and to form one of the principal branches of the Ucayali. But to which of these river systems, that of the Beni or of the Ucayali, the Madre de Dios really belongs, must now, I fear, remain in doubt, till some adventurous pioneer is bold enough to launch a boat upon the Madre de Dios, and risk his life among the savage Chuncho Indians, to settle the question.

I am happy to say that we have recently learnt that Mr. Chandless has safely returned down the Purus from his second voyage up it—the object of which was to explore the Aquiry, its main branch from the southward, which he was unable to examine on his first trip,—and that he may be shortly expected in this country with the details, which will then complete our knowledge of the Purus.

If, with the valuable aid of Sir Woodbine Parish, I have been thus diffuse, it is because this question is one in which South Americans take as deep an interest as the search for the sources of the Nile creates amongst geographers in our own hemisphere.

United States of Columbia.—I mentioned in my Address last year that His Excellency General Mosquera, who has been since chosen, for the third time, President of the United States of Columbia, was engaged upon a work on those countries. It has since been completed, and under the title of 'Compendio de Geografia General de los Estados de Columbia,' may be well called a complete Handbook, on the very best authority, of the countries it describes, and is highly creditable to the Gran-General, who, notwithstanding his many important duties has found time to compile such a mass of

interesting information. It is accompanied by an atlas of maps, corrected from the surveys of Codazzi and others, under the General's special directions.

Topographical Survey of Buenos Ayres.—From Buenos Ayres we have received from our Corresponding Member, Don Saturnino Salas, President of the Topographical Department of the Argentine Republic, the remaining sheets of the great survey of the Province of Buenos Ayres, recently completed by the officers of that department, and to which I must call attention, as showing the remarkable extension of those agricultural and pastoral establishments which promise to make it the most flourishing and important of all the South American republics; whilst steam and railroads, chiefly promoted by British enterprise, are doing their work in developing the resources of the interior, which, till a few years ago, was an inaccessible and uncultivated waste. The numerous names of our countrymen which appear upon the map amongst the landed proprietors, show how large an interest British capitalists have acquired in that part of the world.

NORTH POLAR EXPEDITION.—*Greenland.*—After the great zeal which was manifested last year by the Council of our Society, and by numerous Arctic explorers of eminence, in favour of a searching expedition to determine the true condition of the region around the North Pole, it is mortifying to be under the necessity of stating that there is at present no prospect that such an enterprise will be undertaken. Every person experienced in Arctic voyages being of opinion that a well-found Government expedition alone could succeed (private enterprise being out of the question), the Royal Geographical Society took the lead in pressing upon Her Majesty's Government the desirability of completing those Arctic researches which had already so distinguished our country. Unfortunately, as we think, the Admiralty have been unwilling to listen to our appeal, though it was backed by the opinions of the Royal Society and all the Scientific Societies of the Metropolis, as well as by the Imperial Academy of St. Petersburg, and other foreign scientific Bodies in Europe and America. Nor has the project so creditably and energetically taken up by the Geographers of Germany, headed by Dr. Petermann, had a more favourable issue; the present unsettled and warlike state of that great country being hostile to any such enterprise.

In the mean time, and while hoping for a change in the opinions on this point only of those who so ably direct our naval affairs, I

must direct your attention to a project to explore the northern coast-line and interior of Greenland, which seems to me to call for your hearty good wishes. One of our younger associates, Mr. Edward Whymper, already distinguished by his courage and self-reliance in surmounting the highest peaks of the Alps, has conceived the bold project of penetrating along the surface of some of its glaciers into the interior of this snow-clad continent, being convinced, from the number of deer which sometimes find their way to the coast, that there are, here and there, well grassed valleys and recesses. He also believes it possible to trace by land the extent of Greenland to the north, which you will recollect was one of the main geographical objects of our projected North Polar expedition. On application to our honoured associate Admiral Irminger, to provide Mr. Whymper with a suitable companion, I am happy to say that a well-trained Danish guide is ready at Copenhagen to join our traveller, who is determined to make a preliminary trip to Greenland next spring, and afterwards to endeavour to accomplish what no one before has ever thought of. This is truly the *ne plus ultra* of British Geographical adventure on the part of an individual!

AFRICA.—In a postscript to the last Address I had the gratification of announcing the arrival at Khartum of Mr. Samuel White Baker, after the completion of those arduous and extensive journeys in which he discovered that second great water-basin of the Nile to which he assigned the name of "Albert Nyanza." Nothing which has happened since the foundation of this Society gave me greater satisfaction than that this devoted and high-minded traveller should have thus proved himself to be truly worthy of the medal which had previously been given to him, and received by his brother at a time when, indeed, we were not certain of ever seeing Mr. Baker again! But as we decerned our highest honour to him for the chivalrous spirit he had displayed in rushing to the rescue of Speke and Grant, and for that gallant endeavour—whatever might be the result—to complete the first outline survey of Central Equatorial Africa, so I naturally rejoiced the more when his efforts were crowned with such triumphant success. Since that time we have had from Mr. Baker himself an eloquent and vivid sketch of his explorations and of the difficulties which he and his devoted wife had gone through during their five years of pilgrimage; and referring you to our 'Proceedings' for an outline of his discoveries, I have now to announce the issue of his work, in two volumes, entitled 'The Albert Nyanza, Great Basin of the Nile.' This work, written

in an unaffected, clear, and vigorous style, and illustrated by singularly telling sketches, will, I doubt not, rivet the public attention, and be most widely circulated. I will now only advert to two of the many results of his intrepid and persevering researches. First, the verification of the accuracy of the positions determined by the astronomical observations of his lamented precursor, which is of vast importance, for it has blown to the winds the rival claims of others, and has proved the truthfulness of the data established by Speke.* Next, the realization of the existence and definition of the vast water-basin of the Luta Nzige, sketched out from native information by Speke; an event of the highest importance in the annals of African scientific research.

It is true that, in the days of Ptolemy, the Nile was described as flowing from two lakes, and afterwards, in the middle ages, it was so placed upon old maps; but, irrespective of these bodies of water being most erroneously laid down as to latitude (*i. e.* many degrees south of the equator), their true relations to each other and to the Nile were wholly unknown, for neither of them had ever been visited by an European. Any knowledge respecting them must, therefore, have been obtained from the natives or Arab merchants. In the old maps I refer to,† the two lakes are represented as being perfectly unconnected, each sending off long independent streams, which afterwards, and far to the north, unite and then form the Nile. Our modern British discoverers have shown that the Victoria Nyanza of Speke, lying at an altitude of 3740 feet above the sea, is united with the Albert Lake by discharging its surplus waters into that grand lower basin, which Baker has found to attain an altitude of 2720 feet only and therefore to lie 1020 feet below the upper lake, or Victoria Nyanza of Speke and Grant. On former occasions I have directed your special attention to the striking phenomenon of the long system of water-basins, lakes, and rivers flowing therefrom which prevails in the elevated plateau-ground of Central Africa. Many of these bodies of water lie, so far as we know, in shallow depressions, the

* I rejoice to announce that the obelisk for which many of us have subscribed, to be erected to the memory of the lamented Speke, will, by permission of the Queen, be shortly erected in one of the principal walks of Kensington Gardens.

† Maps in the library of the College "de Propagandâ Fide" in Rome; also maps re-published by the late Mr. Hudson Gurney. See also this subject illustrated by our associate Mr. John Hogg, in his interesting treatise "On some old maps of Africa, in which the central Equatorial Lakes are laid down nearly in their true positions," published in the Transactions of the Royal Society of Literature, 1864.

edges of which extend into marshy lands. Now, the Albert Nyanza of Baker is a striking contrast to all such lakes; for this enormous body of water, estimated to be about as long as Scotland, is a deep excavation in hard granitic and other crystalline rocks. Looking to the simplicity and antiquity of the geological structure of Central Africa—as spoken of in my previous Addresses *—it is this result of the exploration of Mr. Baker, or this profound excavation in hard rock, which has most interested me, and must, I am sure, interest all my brother geologists as well as physical geographers. For, if this great depression in hard rocks be not due, as I think it is, either to natural conformation or to some of the great movements to which those rocks may have formerly been subjected, how else are we to account for its existence? I have previously shown, from the absence of all marine deposits of tertiary and detrital age, that Central Africa has not been submerged in any of those geological periods during which we have such visible and clear proofs of great subsidences, elevations, and denudations in other quarters of the globe. Hence we cannot look to the sea as a denuding power in Central Africa. Still more impossible is it to seek in the existence of former glaciers an excavative power; for here, under the equator, not only can no such phenomena have occurred, but even if the application of such a theory were possible, it would be set aside by the fact of the entire absence, in Central Africa, of any of those moraines or transported débris which are the invariable accompaniments of glaciers, or the erratic blocks transported by former icebergs.

The discoveries, therefore, of Mr. Baker, which show that the vast lake of Albert Nyanza lies in a deep hollow subtended by mountains of hornblendic gneiss, quartz and porphyry, is an admirable datum for geologists to rely upon, who, whether looking to the physical geography and outlines of Central Africa, or to its extremely simple geological structure, are fairly enabled to refer this great variation of outline either to the original devious evolutions of great masses of molten matter, or to some great ancient movements of dislocation among very ancient metamorphic strata. In short, Central Africa presents no existing denuding agent which, if it operated for millions of years, could have excavated the enormous hollow in which the great Albert Nyanza lies.

* See the Addresses of 1852, p. cxxii; of 1857, p. clxvii; of 1858, p. ccviii; of 1859, p. clxxix; of 1863, p. clxxii; and particularly the Address of 1864, p. clxxxv, in which the geological as well as physical structure of Central Africa is sketched out.

Turning from Central Equatorial Africa to the West Coast, I again advert with pleasure to the zealous endeavours of M. du Chaillu, on which I spoke last year, to reach Central Africa from his old station near the mouth of the Fernand Vaz. Alas! you have now heard from himself how, by an untoward accident, he was prevented from reaching the heart of the loftier and higher mountains into which he was penetrating, making by the way numerous astronomical observations and photographing, as he went along, the scenery and costumes of the people. Correcting the outlines of his first map of these regions, which he had rapidly constructed without any real survey, he made his bold and highly adventurous journey into the interior, accompanied by a few faithful coast natives only. From Olenda in the Ashira country, which he visited on his former journey, he made an excursion northward to the Samba Nagoshi Falls, the correct position of which he has thereby determined, and afterwards diverging from his former route, he continued his journey eastward, and reached the village of Mooaoo Komba, 440 miles distant by his line of march from the western coast. I feel convinced that but for the unlucky accident which caused the natives to rise upon him he would have realised those expectations to which I gave expression at our last Anniversary.

When his whole narrative is published (including a vivid picture of his disasters and escape), I am sure the public will see in it the evidences of much patient research and lively observation; indeed, I know that the points in natural history which he announced, after his former journey, as original, but which were discredited by some persons, have been confirmed by Professor Owen and others, who have since examined actual specimens of the very animals the existence or nature of which had been doubted.

It therefore gave me great satisfaction when the Council adjudicated to M. du Chaillu a sum of money not merely to compensate him for the loss of instruments, which he had provided at his own cost, but as a testimonial of their approval of the energy and fidelity with which he had endeavoured to realise his bold and gigantic project. In the mean time, through his very numerous astronomical observations, he has fixed many positions over a tract of country previously unknown, which we may designate as "Du Chaillu's Land."

Northward of Du Chaillu's route another traveller, Mr. R. B. N. Walker, is now endeavouring to penetrate into the interior, under the auspices of our Society. After a long delay on the coast, he

proceeded on his journey in December last with supplies which will enable him to remain a year in the interior. His object is to reach, if possible, a large lake, or chain of lakes, reported to exist about 500 miles east of the Gaboon.

Some years ago much interest was excited in the travels of a Hungarian gentleman, M. Ladislaus Magyar, who announced, in letters published in Hungary and in Petermann's 'Mittheilungen,' that he had penetrated into the interior of Africa from Benguela as far as 27° E. longitude, and a brief account of his explorations was published in the 24th volume of our Journal. My attention has recently been drawn by his accomplished countryman, Dr. Rónay, to the published work of this traveller, the first volume of which appeared in 1859 at Pesth, in the Hungarian language, under the editorship of M. Hunfalvy János. This volume comprises only the early portion of his travels, between the coast and 19° E. longitude, during which the traveller married the daughter of the powerful chief of the Bihé country. In subsequent expeditions, the narrative of which was to have formed two other volumes, he advanced much further to the north-east and south-east, and visited previously unknown regions north and south of Livingstone's line of march in his famous journey between the Makololo country and Loanda. It is now more than five years since he sent home the manuscript of his first volume; and he then stated that it would be followed by the second, which at the time he wrote was nearly finished. Since then nothing more has been heard of him; and his friends having applied in vain to the Portuguese Government for information, it is feared that he has perished.

A comparison of the results of these explorations, as far as they have been published, with those of Dr. Livingstone has already been entered into by Dr. Petermann and other writers. My object in now introducing the subject is to record that Dr. Rónay, having given me an analysis of the first volume of these travels, states that although Ladislaus Magyar was very careful in giving the degrees of latitude and longitude and the elevations above the level of the sea, and says that he used instruments, he does not specify their nature. In so remarkable a series of journeys the absence of full information on these points is a great defect, especially as the first sketch of his travels, published, as I have before stated, in our Journal, was considered, by the able critical geographer, Mr. Cooley, in the commentary appended to the paper, to be very doubtful as

regards the geographical positions. The narrative, however, is full of interesting observations concerning the manners and political and religious institutions of the people, visited by a traveller who spoke their language and lived amongst them almost as a native.

Of the melancholy termination of the well-found expedition of the intrepid Baron C. von der Decken, from which so much was anticipated, notice has already been taken in treating of the career of that distinguished traveller, with whose death we must, I fear, abandon all hope of ever reaching Central Africa, or the countries watered by the Nile, by first passing through the Somauli countries and then through a region inhabited by the more savage Gallas.

With brighter hope I turn to the prospects of the sagacious and energetic Livingstone. Cordially received and supported at Bombay, he proceeded to Zanzibar, where he has the assistance of the Sultan, and from whence his expedition will be directed, as I announced last year, to the Rovuma River. After ascending that stream he will first determine the course of the waters between his own Lake Nyassa and the Tanganyika of Burton and Speke. Next, if he can reach the latter, and, after building a boat on it, is able to proceed to its northern end, he will at once settle the agitated question whether this lake be really, as some suggest, the ultimate southern water-basin of the Nile. If it should prove to be so, it follows that the altitude of Tanganyika, as given (by a bad instrument it is true) by Burton and Speke, was very erroneous, for by their measurement it was more than 800 feet below the level of the Albert Nyanza as fixed by Baker.

It is a circumstance of true gratification to me to know that Dr. Kirk, the tried and valued associate of Livingstone, should recently have been appointed the Government medical officer to the Resident at Zanzibar; so that in the absence of the Consul he will have ample opportunity of succouring his old leader, now the accredited Envoy to all the chiefs of Inner Africa. Dr. Kirk has also received authority from the Foreign Office to take every feasible step to obtain the release of the captives—if such there be—consisting of the crew and passengers of the *St. Abbs* Indiaman, the account of the shipwreck of which vessel on the Somauli coast was recently brought before the Society in a very telling manner by Colonel Rigby, formerly Consul at Zanzibar, and who was the zealous supporter of both the great African expeditions, which proceeded from that island.

Just after I had written the preceding lines, I learned with great

satisfaction, through a letter from Dr. Livingstone, of the 24th March, to his daughter, that he had reached the mouth of the Rovuma River in an Arab dhow, with his followers, and six camels, three asses, and three buffaloes. As it was found impracticable to ascend the Rovuma with the vessel, or disembark the animals on its banks, the party was taken on by Lieut. Garforth, R.N., to Mikeridamy, a fine harbour to the north of the Rovuma, where they were about to land when the letter was despatched. As the people of that tract are under the control of the Sultan of Zanzibar, with whose protection Livingstone is fully provided, and as the route is said to be open to the Lake Nyassa, our self-reliant and energetic envoy writes in the full persuasion that, with time and prudence, he will not only reach the watershed between Nyassa and Tanganyika, but be able to settle the question as to the elevation and drainage of the latter.

Conclusion.—This Address has now reached a length beyond that within which it was my wish to confine it, chiefly through the lamentable fact that several of our most eminent associates have passed away since our last anniversary; for you will doubtless all approve of my efforts, imperfect as they may have been, to do justice to their various merits. I have had also to dwell on the brilliant discovery of Baker, the meritorious explorations of the Purus by Chandless, on the recent great opening out of Northern or Intertropical Australia, on the admirable progress of the Surveys of Northern India, and various other topics of deep interest to us all. But, far from diminishing our anticipations, each of these advances in distant lands has but laid open new vistas, which invite the enterprise of future travellers; whether it be in Africa, Central Asia, South America, or Australia, to say nothing of the untrodden interior of New Guinea.

So long as such fields of research remain, the Englishman of our day, and of the future, will, I doubt not, strive to penetrate unknown countries as ardently as his ancestors did in the days of a Raleigh or a Drake. It is, indeed, the high opinion which our countrymen entertain of any one who thus boldly adventures on the search after fresh knowledge, which is the mainspring of the continuous and advancing prosperity of the Royal Geographical Society.

Let us, therefore, be of good heart when we look to the coming year, at the close of which, and on the termination of my duties as

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your President, I feel confident, that if I then be among you, I shall have to congratulate you once more on uninterrupted success and new triumphs, and that it will only then remain for me to take leave of you with the hopeful watchword of all true geographers, "Forward, ever Forward."

POSTSCRIPT.—*Meteorology.*—In the rapid and necessarily imperfect sketch given at p. 223 of the history of the recent advances in Meteorology, there are errors which call for correction. It ought to have been mentioned that the first great advance in Land Meteorology originated really in a joint recommendation of the Royal Society and British Association in 1839-40, in pursuance of which observations were carried into effect, at various points of the British Dominions, on a most extensive and systematic plan, and that the continuance and extension of the system was the special object of a Meterological Congress which assembled at Cambridge in 1845, and which had a vast influence on the advance of the statistics of Land Meteorology. With regard to Ocean Meteorology, few but those who are occupied with such questions are aware of the great services rendered to this branch of science by General Sabine, the far-seeing President of the Royal Society, who, on the part of that body conducted a correspondence with the different departments of Government in 1852, and especially in 1855, which formed an epoch in Meteorological science.