ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 25th May, 1857,

BY SIR RODERICK IMPEY MURCHISON,
G.C.St.S., D.C.L., F.R.S., &c.,
PRESIDENT.

GENTLEMEN,—Having been called, through your kindness, to resume the honourable duty of presiding over you at a season, when the Royal Geographical Society has attained a condition more flourishing than its warmest well-wishers had anticipated, it is grievous to open this Address by dwelling upon the decease of my predecessor, the gallant Admiral Beechey, as well as that of my successor when I vacated this chair in 1854, the noble Earl of Ellesmere. Never since the foundation of our body has the hand of death fallen so heavily and so rapidly upon our leaders, and never has a more painful task been thrown upon your President, than that of recording the loss of two such men, however mitigated by the endeavour to do justice to their eminent and dignified characters. To delineate all their merits, even if I had the power, would be impracticable in the brief space of time to which I can lay claim on this occasion, and I shall, therefore, simply endeavour to place on record some of the salient features in the characters of my lamented friends, which more particularly connect them with the great pursuits of this useful Society.

Rear-Admiral Frederick William BEECHEY, the son of the late Sir William Beechey, R.A., was born in February, 1796, and before he reached the age of ten years was already serving as a midshipman in the Royal Navy. He bore a part in Commodore Schomberg's brilliant and decisive action off the Isle of France in 1811, and

after active employment in the expedition to New Orleans in 1815, he soon attained the rank of Lieutenant.

In 1818, public attention was again attracted to Polar exploration, which had been neglected during a lapse of forty-five years, chiefly through the exertion and energetic writings of our associate, the late Sir John Barrow. Lt. Beechey then served in the expedition under Buchan, and was appointed to the Trent, commanded by Franklin, who was also accompanied by Back. Having coasted the west side of Spitzbergen, they were finally arrested by heavy floe-ice in lat. 80° 36′ N. From some mistaken feeling on the subject, no account of the proceeding was published till 1843, when Beechey, remembering old Hakluyt's imputation on some of our early writers, who he says "should have used more care in preserving the memoires of the worthy actes of our nation," brought out, under the authority of the Admiralty, a most interesting narrative of the voyage.

Subsequently our adventurous young officer joined the Hecla, and assisted the first great effort of the celebrated William Edward Parry (his former shipmate) to cut through the barrier of ice into Barrow Strait, beyond the 110th degree of west longitude, for which these officers and their companions justly received a parliamentary reward. In 1821-2 he had the good fortune to serve under the orders of our former esteemed President, Admiral W. H. Smyth, then surveying the Mediterranean, in co-operation with whose ship, the Adventure, he explored a considerable portion of the north shore of Africa.

During the three and a half succeeding years the sands of Cyrenaic Africa were exchanged for Pacific and Arctic researches, when, commanding the Blossom, Captain Beechey made accurate surveys of many islands in the Pacific, of the coasts of Russian America and of Behring Strait, of all of which he has left an admirable record in the work entitled 'Narrative of a Voyage to the Pacific and Behring Strait, to co-operate with the Polar Expedition.' In this publication, our respected President has left a record of scientific knowledge which places him high among the standard authors of our time.

To one portion of this work, which describes the exhumation of such vast quantities of bones of mammoths and other extinct mammalia from the cliffs of Escholtz Bay, in Russian North America, the late Dr. Buckland has rendered full justice.

At a later period, Captain Beechey surveyed the west coast of South America, and determined many points of high geographical

importance. Lastly, examining the shores of the Irish Channel, and performing much severe and valuable service to the detriment of his health, he produced many highly useful charts, and threw much light on the nature of the Channel tides. The result of these, his last labours afloat, was the publication of two very able and valuable memoirs in the 'Philosophical Transactions.' The first of these (in 1848) was entitled 'A Report of Observations made upon the Tides in the Irish Sea, and upon the similarity of the Tidal Phenomena of the English and Irish Channels,' &c. The principal object of the author was to point out the independence of the *set* of the *tide-current* in those seas, on the actual *state of the tide* as ebbing or flowing; and he showed, by a masterly exhibition of the facts, that there is no apparent connection between the direction of the stream and the rising or falling of the water. In addition to this, he laid down instructions for ascertaining the state of the tide, the value of which was much enhanced by two explanatory charts and many smaller diagrams.

This memoir, addressed to Sir F. Beaufort, was followed in 1851 by another letter to the same eminent hydrographer, which was written with the hope that its contents, when sufficiently known and circulated, would be the means of diminishing the number of those losses of both life and property, with which the annals of Lloyd's abound, and of advancing our knowledge of the tides, by the practical illustration of the phenomena of the tidal streams of straits under the influence of a combined wave.*

After the cessation of his arduous maritime exertions, Captain Beechey was appointed to the important post of Superintendent of the Marine branch of the Board of Trade, the duties of which he executed to the day of his death in a manner which drew from every successive Minister of the Department, the warmest acknowledgments of that clearness and precision of thought, and that skilful performance of official duty, which characterized our late President throughout his whole career.

Obtaining the rank of Rear-Admiral in 1854, he succeeded the Earl of Ellesmere in this Chair in 1856, and we all know with what sincerity he devoted his energies to the advancement of geography, how ably he directed our proceedings, and with what urbanity he presided over our meetings. Alas! I have too much reason to believe that the zealous endeavours he made to serve us, combined

* Phil. Trans., 1851, p. 717.

with the important duties of his office in regulating and improving the scientific instruction of the mercantile marine, acting on a constitution which had been sorely tried in many a clime, hastened that catastrophe which we so deeply lament.

Not long after his election to the post of President he was attacked by a severe illness, from which he only partially recovered during a summer's voyage in the yacht of the Trinity House. To that malady he feelingly alluded in the opening part of his excellent Anniversary Address—the only one he was permitted to deliver—when he thanked the other officers of our body for the effective manner in which they had conducted the affairs of the Society during his absence. On coming with his family to Tunbridge Wells in the autumn, where I happened to reside, I found that our zealous President was suffering from a disease of the heart. His affectionate wife and daughters then felt indeed, as well as myself, that the utmost tranquillity was essential to the preservation of his valuable existence; but he persisted in struggling with unflinching spirit to transact business both at the Board of Trade and in our Society. So dominant was this feeling that on Monday the 24th November, Admiral Beechey attended the rooms of this Society, and gave me, as the Vice-President he had selected to represent him, precise directions for conducting the business of the Council and of the evening meeting of that day. On Saturday, the 29th, alas! he was no more; thus exhibiting that firm resolve to do his duty to the last, which has ever been the glory of those British seamen among whom Admiral Beechey stood pre-eminent. He had long been a distinguished Fellow of the Royal Society, and was a member of the Council of that body at the period of his decease.

Francis, Earl of Ellesmere, a Knight of the Garter, Lord-Lieutenant of Lancashire, and our President during the years 1854-5, was the second son of the first Duke of Sutherland, and that gifted lady the Duchess Countess of Sutherland. He was born in 1800, and died on the 18th of February, 1857.

In endeavouring, with the approval of the Council, to induce this accomplished nobleman to succeed me in occupying the Chair of this Society in the year 1854, I felt certain, from an acquaintance of thirty years' standing, that through his varied knowledge, generous nature, and love of geography, he would render us right good service. His conduct in directing our affairs has indeed met with your hearty approval; and as we lamented that our

rules, limiting the presidential duties to two years, led to his retirement, so we have now to grieve over his demise, at the comparatively early age of 57.

Educated at Eton, and distinguished at Oxford, Lord Francis Egerton soon took a high place in the House of Commons, and served with ability both as Secretary for Ireland and Secretary at War. As he advanced in years he seemed to care less and less for political distinction; and as it is not my calling to dwell on his ministerial or parliamentary career, let me briefly remind you how he occupied many hours of his well spent life in cultivating and cherishing letters, science, and art.

I will first speak of those anonymous writings which, as they have exercised a salutary influence on society, ought to be made known, both to render justice to the man, and to indicate the great variety of his acquirements.

My auditors, who may have only known Lord Ellesmere as a member of either House of Parliament, or as our President, may not be aware that between the years 1834 and 1854 he was the contributor of not less than fifteen articles to the 'Quarterly Review;' and that about one-half of them were connected with the development of geographical research. Eschewing the troubled arena of party strife, he left no trace behind him of political acrimony even in those essays which touched upon disputed questions; whilst all of them, which did not bear upon the science we cultivate, were devoted to the fine arts, of which he was a true connoisseur, or to biography, and those military exploits which have raised the glories of Britain.

On geographical subjects he began by such attractive accounts of the works of the Dutch authors Meiglan, Fischer, and Doeff, that any one who will peruse his 'Sketches of the Manners and Usages of the Japanese' will find in them a most vivid picture of the life of that curious people, who, inhabiting a region separated from either continent, are apparently destined to remain longer an unbroken unit than the colossal empire of China. Of the Japanese he humorously wrote that he "left them to the complacent enjoyment of the conviction that they are the first of nations, and the eldest descendants of the Deity."*

Turning to the Eastern Archipelago, he has consigned to us a

* Quarterly Review, vol. lii. p. 317; vol. lvi. p. 438.
In his recent translation for the Hakluyt Society, of the Père d'Orléans' 'History of the Tartar Conquerors who subdued China,' Lord Ellesmere was largely assisted by his accomplished daughters.

memorial of the lively interest he took in that chivalrous expedition of our old associate, Sir James Brooke. After a preliminary sketch of the preceding wretched condition of Borneo, condensed from the descriptions of Sir Stamford Raffles, he painted, with the hand of a skilful master and a warm friend, all that the adventurous Irish gentleman was accomplishing. Every old member of the Raleigh Club and of this Society, recollecting the deep interest we felt in the successful voyage of the little schooner of the Yacht Club, fitted out by Mr. Brooke, will re-peruse with gratification the lines, which indicated that the young explorer of that day was destined to become the Rajah of Saráwak, and to receive not only our gold medal, but his due reward at the hands of his Sovereign.

Then, in his analysis of Arctic and Antarctic researches, Lord Francis Egerton gave long ago earnest that he was worthy to become our leader. In his review of the narrative of discoveries on the north coast of America, made by the officers of the Hudson Bay Company, in which the enterprising Simpson lost his life, we find him evincing those large views and kindly feelings which led him invariably, in subsequent years, to countenance and support those expeditions in the search after Franklin, which have shed so much lustre upon our country.

Again, when commenting in 1847 upon the memorable Antarctic discoveries of Sir James Ross and the natural history collections of Dr. J. Hooker, we see how emphatically he dwelt upon the exploits which he anticipated from our Arctic heroes when he penned these lines:—

"With interest which accumulates by the hour do we watch for the return of those two vessels, which are perhaps even now working their way through Behring Strait into the Pacific. Should the happiness be yet allowed us of witnessing that return, we are of opinion that the Erebus and Terror should be moored henceforth on either side the Victory, floating monuments of what the Nelsons of discovery can dare and do, at the call of their country in the service of the world." *

This was one only of the many soul-stirring paragraphs indited by my noble friend on a subject so near to his heart—one on which he never abandoned hope, as proved not only by his signing, with many of us, last year that petition to the Government, which is printed in our Proceedings,† praying for the final search of a

* Quarterly Review, vol. lxxxi. p. 167.

† Proc. Roy. Geogr. Soc., No. iv., p. 95, June, 1856.

limited Arctic area, but also by his willingly undertaking to make that appeal to the House of Lords in the last session of Parliament, which, in his unavoidable absence, was effectively made by Lord Wrottesley, the President of the Royal Society.

Among the last of Lord Ellesmere's anonymous contributions on geographical subjects, immediately preceding his two eloquent addresses to this Society,* I may advert to his lively account of Castren's Travels among the Lapps, in which he justly eulogised that enterprising Finn and his learned countryman Wallin, the successful explorer of Arabia. In other fragments of periodical literature he indicated his admiration and right estimation of engineering works in the article on the Skerryvore Light-House, and again in a very instructive Review of the progress in canalization, proceeding as it did from the inheritor of the great Bridgewater Canal.

Of his thorough acquaintance with the fine arts, Lord Ellesmere has left pregnant evidences in the pages devoted to his estimate of English artists, and to the elucidation of fresco painting. Liberally employing his wealth in making well-chosen additions to the gallery of paintings he inherited, he reared for their preservation, and for the residence of his family, that palatial structure designed by Sir C. Barry, which has scarcely a rival in our metropolis.

A distinctive feature in the character of Lord Ellesmere was his deep admiration of martial deeds. His veneration for the Duke of Wellington, founded upon a study of his campaigns, was matured by a personal intimacy of many years, during which the great Captain himself furnished the materials, which enabled our deceased President to give to the world a clear and well-condensed account of the battle of Waterloo.

The spirited sketch of the life of Blucher, the 'Marshall Vorwärts' of the Prussian soldiery, written in 1842,† was followed in 1845 by a luminous analysis of the French and English versions of the battle which decided the fate of Napoleon.‡ On these writings, coming as the chief matter in them did *from Wellington himself*, implicit reliance may be placed; and few historians, I venture to say, will improve upon the style in which the reminiscences of the illustrious Commander were conveyed to the public by our deceased Associate. In all such writings, whether he went back to the days of Wallenstein,§ or traced the struggling career of the old

* *See* Journal Roy. Geogr. Soc., vols. xxiii., xxiv.
† Quarterly Review, vol. lxx. ‡ Ib., vol. lxxvi.
§ Ib., vol. lxi., p. 105.

Scotch General Patrick Gordon,* who fought so well for the Czar Peter, or entered with the lamented Cathcart into the Russian and German campaigns of the first Napoleon,† or stood forth in the hour of trial as the champion of his dear friend the brave Lord Raglan, we invariably applaud the generous sentiments and true appreciation of merit which ever guided the pen in his portraiture of a hero.

The versatility of the talents of Lord Ellesmere was displayed in numerous other works published under his own name. A poet by nature, verses, whether martial, plaintive, or jocose, flowed freely from his heart, and the principal of these being collected under the title of the 'Pilgrimage and other Poems,' the author, with his habitual modesty, spoke of them in his preface as being a collection of the least unpopular of his works.

A master of several languages, he frequently put before his countrymen, in good racy English, the thoughts of eminent foreign authors, and of these efforts, the translations of Goethe's 'Faust' and Schiller's 'Wallenstein' are prominent examples. The number of foreign works which he translated may well surprise us, when we reflect upon his numerous occupations, and among them I may enumerate Clausewitz's 'Campaigns of Russia,' the 'Sieges of Vienna by the Turks,' and the 'Last Military Events in Italy.'

Returning to my noble friend's connection with science, let me ask any old member of the British Association if he ever heard from the President of the year a more inciting appeal than was made by Lord Francis Egerton at the Manchester Meeting of the year 1842. Ranging from science to letters and art, he proved that he truly merited the application of that line with which he honoured his predecessor, Dr. Whewell—

"Through each mode of the lyre, and was master of all."

It was then that I rejoiced in being one of those assembled at Manchester, to bear witness that this distinguished nobleman, the possessor of large domains, was as truly esteemed by every artisan of that vast hive of industry, as he was beloved by his tenantry and agricultural labourers.

If it was specially when surrounded by his family and friends that the genuine heartiness and wit of the man came out most strikingly, every public act of his life was carried out with such stedfast sincerity and true liberality, that, whether he presided over a Royal commission, a literary or scientific society, or a parish vestry, he did his duty with his whole heart. Philanthropy and generosity

* Quarterly Review, vol. xc., p. 314. † Ib., vol. xc. p. 1.

were to be discerned, indeed, in all his actions by those who knew how quietly and unostentatiously he sustained with his purse men of genius, who were labouring under difficulties, and who, but for his timely aid, could never have produced works which have taken a high place in science and letters.* These acts were well crowned by that full-handed munificence with which he strove to succour our famishing and ill-clad soldiers in the Crimea.

In addition to the stores of varied knowledge which he could at all times playfully and instructively draw forth from his capacious mind, there was in Lord Ellesmere a fund of cheerful benevolence which bound to him affectionately every one who enjoyed his friendship. I cannot therefore better sum up the leading merits of our former President than in the expressive words of one of his most intimate and valued companions :—

"His calm exterior and tranquil manner covered a deep-seated enthusiasm for the honour of his country, for the progress and amelioration of his species, and for all that was grand and noble in sentiment or in action.

"They can bear testimony to this truth who have seen him kindle over the recital of some great battle of the Great Duke, or some less famous deed of individual heroism,—who have witnessed the eager interest with which he watched the bold enterprises of modern navigation,—or who have heard his lucid and animated explanations of the mechanical inventions for diminishing labour, or perfecting manufactures, in the vast workshops connected with his canal property. While his ardent spirit rejoiced in every discovery achieved by science, and every new phase of beauty elicited by art, his accumulated knowledge and cultivated taste enabled him to appreciate the merit and calculate the consequences of each; and he was ever ready to employ the influence of his position, the vigour and liveliness of his pen, and the princely contributions of his purse for the furtherance of such purposes.

"His high estimation and assiduous study of the science to which the Geographical Society is especially devoted, were the result of that large range of knowledge which opened his mind to its infinite relations—moral and material, social and political—with the future destinies of mankind. In him the geographer was blended with the statesman and the philanthropist, not in wild and utopian spe-

* Let me cite one of several cases known to myself. When the eminent naturalist Agassiz was likely to have the publication of his great work 'Les Poissons Fossiles' stopped for want of means, Lord Ellesmere gave 500*l.* for the original drawings, which he immediately presented to the Geological Society.—R. I. M.

culations (for the poet's imagination was controlled by a sober judgment and a jealous love of truth), but in those prescient views which result from extensive acquaintance with the physical circumstances of remote regions, and from well-reasoned calculations of their several capacities for the advancement of civilization and the increase of human happiness." *

Suffering from complaints with which he had long struggled, and aware that the climate of Lancashire was hostile to his frame, Lord Ellesmere still persisted in residing during a portion of the year in that district where he felt he had, by the will of Providence, a responsible task to perform. Raising, therefore, a beautiful edifice near the entrance of his own great Bridgewater Canal, and little distant from the town of Manchester, expending large sums in building churches or founding schools, and ardently pursuing every plan for the bettering of the moral and social condition of the people, he braved the moisture of the climate, and only succumbed when, amidst the blessings of all to whom his influence extended, he had effected the main objects for which he lived. Well might the clergyman,† who preached the funeral sermon over his bier, point, not merely to the exalted character of the statesman, the orator, and the scholar, but specially to the true Christian, the lamented Lord of Worsley Hall, in whom all the surrounding inhabitants felt that they had lost the generous patron, the liberal, indulgent master, the charitable and tender-hearted soother of distress and poverty.

In short, as it was impossible to know him well and not to love him, so the deep sorrow which his death called forth is the noblest monument to the memory of the good Earl of Ellesmere. Such, doubtless, is the real consolation of the high-minded and devoted widow, who, cordially participating in all his acts of beneficence, is left to encourage her children to imitate so bright an example.

Dr. Wm. Buckland.—Lost to the world and to his numerous admirers for several years through an impaired state of the mental faculties, caused by a diseased state of the bones at the base of the skull and of the neck, my valued friend, Dr. Buckland, the Dean of Westminster, expired on the 14th August, 1856, at the age of 73.

The principal merits of this eminent man and the leading events of his life having recently been brought before the Geological Society,‡ of which he was one of the early members, as well as before

* Extract of a letter from Mr. Ralph Sneyd to myself.

† The Rev. St. Vincent Beechey, M.A., brother of our last President.

‡ *See* Address of the President, Col. Portlock, R.E., F.R.S., Quart. Journ. Geol. Soc. 1857.

the Royal Society, whose chief honour * he had received, it does not become me to attempt any analysis of those writings upon the structure of the globe or its former inhabitants, which have been justly regarded as among the chief stepping-stones to the present state of geological science. I will, therefore, confine myself to a brief sketch of a few points in his character, which may convey to those who knew him not, some idea of the powers and habits of this great geologist.

Educated at Tiverton and Winchester, he obtained from the latter school a scholarship in Corpus Christi College, Oxford. There it was that, after he had become a tutor in classics, a youth came to the University (Oriel College), who, having already attained an acquaintance with fossil organic remains, was destined through that knowledge to influence the future career of many of his associates who had similar tastes. This was William John Broderip, afterwards my colleague during five years as joint secretary of the Geological Society, and now well known as one of the eminent naturalists of our age.

The study of the collection made by this juvenile companion, including the jaw of a marsupial quadruped found in the Stonesfield slate, first awakened the dormant talent of Buckland. Cultivating the friendship of the precocious fossilist, he soon developed that peculiar power, which characterized him through life, of catching up and assimilating with marvellous rapidity everything that illustrated the new science of fossil organic remains, then just coming into vogue through the work of Parkinson. So strongly did Buckland feel in after years the deep obligations he was under to young Broderip, that I have myself heard him speak of the latter as his "tutor in geology."

Admiring the original efforts of William Smith, who, in identifying strata by their organic remains and by his geological maps, has worthily acquired the title of Father of English Geology, Mr. Buckland made numerous excursions to examine the rocks in various districts, and in so doing sought out the few promoters of the rising science. The kindred scientific spirits of his Alma Mater, whether older men or of about his own age, were Pegge, Kidd, and John and William Conybeare, the last mentioned, now the Dean of Llandaff, rising afterwards to be the rival of our deceased member as the celebrated author of the 'Outlines of the Geology of England and Wales.' Thus working onwards he qualified him-

* The Copley Medal.

self to obtain that post of Reader in Mineralogy and Geology, in performing the duties of which, he had the great merit of rousing the University of Oxford from its lethargy in respect to the natural history sciences, and in rendering attractive the study of primeval nature.

It is true that his predecessor, Dr. Kidd, had opened out some good paths in the science of mineral geology; but it was reserved for Buckland to create, by his native eloquence and his illustrations, a real and solid taste for geology properly so called, whether as based upon the records of lost races of animals, or on physical geography and the mineral composition of rocks.

Those persons who, like myself, can go back to the days when our deceased member was an inmate of Corpus Christi College, can never forget the impression made upon his visitors, when with difficulty they discovered him in the recess of a long collegiate room, seated on the only spare chair, and buried, as it were, amidst fossil bones and shells. So strange was this conduct considered by the graver classicists, and so alarmed were they lest these *amœnitates academicæ* should become dangerous innovations, that when he made one of his early foreign tours to the Alps and parts of Italy, which enabled him to produce one of the boldest and most effective of his writings, an authoritative elder is said to have exclaimed, "Well, Buckland is gone to Italy, so, thank God, we shall hear no more of *this geology!*" Augmenting his class of students, however, Dr. Buckland persevered successfully in spite of the opposition of the pedagogues of the old school, and certain narrow-minded theologians, who, ignorant of the imperishable records which the Creator has set before us in the book of Nature, endeavoured to destroy the moral influence, if not the character, of any clergyman who boldly taught those undeniable truths. Success happily attended his efforts, and if Buckland had done nothing more than educate a Lyell, a Daubeny, and an Egerton, he would justly have been placed among the most successful instructors of our contemporaries.

Marking the progress which has been made in this branch of science in the few years which have elapsed since it was publicly taught, we may indeed well look back with pity on its feeble opponents, and rejoice that the alumni of the Buckland school have become such strong men, and that the chair, which owed its origin to my illustrious friend, should now be filled by that sound geologist, John Phillips, the nephew of William Smith, who has added to the genius of that geological lawgiver, the richest accom-

plishments of modern science. The publication of his first remarkable work, the 'Reliquiæ Diluvianæ,' naturally secured for Buckland honours and advancement, and through the patronage of Lord Grenville he obtained a canonry in Christ Church. Shortly afterwards Sir Robert Peel, with the appreciation of true merit which characterised him, sought out and cultivated his intimacy, and then came forth that 'Bridgewater Treatise' with which his name will be long identified. For to whatever extent new data have since been obtained, this volume will ever remain a proof of the fertility of illustration with which he could reconstruct and set before us the forms of bygone periods,* and thus make evident to all, the prescience of the Almighty as exhibited in former epochs of creation. In a subsequent year we find Sir Robert Peel, to his great honour, presenting Buckland to the Deanery of Westminster, in which position, notwithstanding his hospitality and important occupations, he still found time to travel to and from his Alma Mater, and lecture on his favourite science, till he was stricken down with the illness from which he never recovered.

But let no one imagine that, whilst some of his leisure hours were thus occupied, including arduous efforts to improve the agriculture of our country, Dean Buckland was inattentive to his duties as the Head of an important Ecclesiastical Body. Not only do his surviving colleagues advert with marked respect and gratitude to his judicious efforts and his honourable conduct in improving their establishment, but the public owe to him their real thanks for the energy and determination with which, in a brief space of time, he effected the reform of abuses which had crept into the ancient school of Westminster. In that Foundation, education could no longer be obtained except at costly charges, and even where these were paid, the youths were ill fed and worse lodged. All these defects were speedily rectified by the vigour and perseverance of Dean Buckland. The charges were reduced, good diet was provided, the rooms were well ventilated, and the building properly underdrained; so that, these physical ameliorations accompanying a really sound and good system of tuition, the fame and credit of this venerable Seminary were soon restored.

As it must be my effort when occupying this chair to connect every deceased member with geographical science, let me assure you, from long personal acquaintance with Dr. Buckland, and hav-

* This work, which was rendered much more valuable by the recent discoveries of Professor Owen, was revised by Mr. Broderip.

ing, indeed, received some of my first lessons in the field from him, that he was really a good physical geographer. No one who followed him even from the valley of the Isis to the summit of Shotover Hill, can ever forget how forcibly he impressed upon the minds of his auditors, the causes which had operated in producing the outlines of the ground—how well he made his pupils comprehend why water rose in wells at certain spots and levels, and why other tracts were dry, or how he taught the young agriculturists the elements of draining, and showed them where the vegetation changed as dependent on the nature of the subsoil.

To whatever realm he travelled, whether over the undulations of Germany or the heights and glaciers of the Alps, he adroitly applied and extended these views, and everywhere exemplified (what I have endeavoured to imitate in my own walk) that union of geology with geography, without which the latter science is deprived of its firmest foundation.

While Dr. Buckland evinced enthusiastic zeal and great ability in the development of any phenomena connected with natural history which he could detect, whether in the organization of animals or of plants, he also often sought to apply his science practically. Thus, the most remarkable of these efforts, which I can now call to mind, proceeded from one of his own discoveries. Perceiving that certain fossil convoluted bodies, when extracted from their native bed in the lias of Gloucestershire, presented the appearance of *fæces*, which had assumed that form from passing through the intestines of reptiles or fishes, he submitted the substances to analysis, and when they were pronounced by the late Dr. Prout to be chiefly composed of phosphate of lime derived from the bones of animals, and that even fragments of the bones were detected in them, he assigned to these bodies the name of "Coprolites." With a fervid anticipation he was afterwards led to hope that these fossil bodies would prove of real use to agriculture; and one of the many regrets I have experienced since his bright intellect was clouded, was that my friend had not been able to appreciate the truly valuable results that have followed from this his own discovery, which, at the time it was made, was treated as a curious but unimportant subject, and almost scouted as being too mean for investigation. The hundreds of tons of these phosphatic coprolites and animal substances which are now extracted to the great profit of the proprietors of Cambridgeshire and the adjacent counties, for the enrichment of their lands, is a warning commentary to those persons of

the "cui bono" school, who are ever despising the first germs of scientific discovery.

The full and true character of Dean Buckland is not, however, to be measured by reference to his works only, including his records of those extinct Saurians of which he was the great historian, or his chief work, the 'Bridgewater Treatise,' nor even by his discoveries in a new science. The indelible impression he made upon all who listened to his instructive lectures—lectures like those which may still happily be heard at Cambridge from the lips of his illustrious contemporary, my old friend and coadjutor Sedgwick—and the general influence he exercised over society by the energetic and telling manner in which he inculcated his doctrines, as founded on observation of the progress of nature from the earliest periods to that icy epoch which preceded the era of his own cavern animals; these are the appeals which have procured for him a name which will last as long as the school of British geologists, of which he was so eminent a leader, shall be remembered!

In closing these few sentences, which, if I were addressing a kindred Society, might be expanded into a volume descriptive of the merits of one to whom I was sincerely attached, let me add that in his accomplished relict, our lamented member has left behind him a truly intellectual and excellent woman, who, aiding him in several of his most difficult researches, has laboured well in her vocation to render her children worthy of their father's name.

Dr. Buckland was a member of many European and American Academies, and a Correspondent of the Institute of France. Every where abroad, as at all great British meetings, and in every social party, he was invariably welcomed as the most cheerful and most successful contributor to the advancement of natural knowledge.

Lieut.-Col. NEIL CAMPBELL, who recently died in Paris on his return from Bombay, was an officer on the Quartermaster General's Staff of the East India Company's service, in which he was distinguished for his zeal and intelligence. He was best known to us as the author of the large Military Sketch-map of Scinde. During his stay in this country on leave of absence, he was one of the officers of the Indian Army who attended the funeral of the Duke of Wellington, and was always a welcome and agreeable attendant at our Club and Evening Meetings.

Captain Thomas GRAVES, R.N., who recently fell under the knife of a Maltese assassin, was the son of a gallant officer of the same name and rank. Entering the navy in 1816, and serving in several

vessels on foreign stations, he was chosen, through his merits, to form one of the scientific complement of the Adventure, in which ship young Graves played so able a part, that his Captain, now Admiral W. H. Smyth, and other officers strongly urged his promotion. During the next five years, he was a companion of that excellent officer the late Rear-Admiral Philip P. King, in his extensive surveys of the Straits of Magellan and the adjacent shores of South America, and it was only during that difficult service, and in the year 1827, that he was appointed a Lieutenant, *i. e.*, after ten years of arduous probation.

After performing, in conjunction with the Royal Engineers, a survey of Lough Neagh in Ireland, the next ten years of the life of Captain Graves were spent in surveying the Greek Archipelago, first in command of the Beacon, and next of the Volage corvette. These surveys were suddenly put a stop to by an order of the Admiralty, which both Sir F. Beaufort and Admiral Smyth considered to be an "inscrutable measure," and a heavy blow inflicted on this important branch of the naval service.

Whilst compiling about one hundred charts and plans of the Grecian Archipelago—as interesting to the antiquary and historian as they are valuable to the navigator—Captain Graves had the singular merit of attracting to his little ship the Beacon, as his friend and companion, that young naturalist Edward Forbes, then rising in the estimation of his contemporaries, and who, after passing nearly two years in dredging the Ægean Sea, and in developing the conditions of life and habits of submarine animals at various depths, threw a broad new light upon geological science. The name of Graves must therefore ever be associated with that of Edward Forbes! Even to Captain Graves himself geologists are much indebted, for his numerous contributions of fossils from distant parts. That these were very important all my contemporaries are aware, and particularly those still living, who, like myself, frequented the rooms of that remarkable naturalist Charles Stokes, whose merits I attempted to place on record for the late Lord Ellesmere when he last occupied this chair. To this Society Captain Graves communicated a description of Skyros, and was the cause of our Journal being enriched by the instructive papers of his assistants Spratt and Leycester.

Ever zealous in advancing knowledge, he also afforded to Sir Charles Fellows assistance in the investigation of the antiquities of Lycia, that was duly acknowledged. Such conduct surely called

for some mark of public approbation; but although the Sultan and the King of Greece specially thanked Captain Graves for services important to humanity, this meritorious officer never received any honour from his own country. Yet who can place in comparison with the anxious, untiring energy and science displayed during life by such nautical surveys as those of Thomas Graves, the lucky accident of a few months' war service in the Baltic or the Black Sea, in which perchance the individual decorated may not have accomplished any one feat of arms? Honour then to the Governor of Malta, Sir W. Reid, whose warm sympathy was offered to the neglected and really eminent scientific sailor. The offer of the post of Superintendent of the ports of Malta was willingly accepted, and the gallant Graves had zealously performed the duties of it during three years, when he received a mortal stab from a revengeful boatman, that deprived our country of his services. His kind, open-hearted and friendly disposition had long endeared him to every one who knew him; and from a personal intercourse of many years' date, I can well realize to my mind's eye the gloom, as attested by the public journals, which spread over the inhabitants of Malta on the occasion of his sad fate. Captain Graves was an old Fellow of the Royal Society, having been elected in 1826, and he was also one of the original members of the Royal Geographical Society.

Lieut.-Colonel Thomas Best Jervis, of the Engineers, in the East India Company's Service, who died recently in London, at the age of 60, was formerly well known for his numerous important works in the Bombay Presidency, including Indian Metrology, and an elaborate treatise on the primitive universal Standard of Weights and Measures, &c. When a lieutenant, he served as the engineer in 1821 of the field force under Sir L. Smith sent to the Persian Gulf. On that occasion the Arab pirates were subdued, and the Fort of Beni-bu-Ali was taken after a vigorous resistance; operations in which he was distinguished. After repairing and putting in order many forts he was employed as a captain for ten years in making the trigonometrical survey of the Southern Konkan, a fertile country at the foot of the Ghauts. This Survey, when adjusted by the Grand Trigonometrical Survey, was incorporated into the Atlas of India, of which it formed several sheets. Fertile in resources, he devoted his residuary leisure to various useful purposes, such as building a suspension-bridge or opening out slate quarries in his Eastern abode. In 1838 he was provisionally

appointed by the Court of Directors to be Surveyor-General of India; but the appointment never really took place, as Colonel Everest had not resigned.

Colonel Jervis was the successful translator of Baron Hugel's Travels in Cashmir, and he had, I understand, translated other voyages and travels, which were never printed. Being well known for his untiring energy and his accomplishments as well as for his acquaintance with foreign languages, and having shown his foresight by the publication of a translation of the Russian map of the Crimea, and the rapid transference by the anastatic process of the Austrian military map of Turkey and the adjacent countries, he was proposed to the Treasury, and was appointed during the late war, to organize and conduct a topographical sub-department of the Government, in which he prepared numerous maps and plans. He had been a Fellow of the Royal Society since the year 1838, and was a frequent contributor to the library and map office of this Society.

The Rev. Thomas Halford, M.A., Oxford, who died in the 68th year of his age, was a well educated gentleman, and ever desirous of promoting art and science. Being partial to the Geographical Society, and a constant attendant at our anniversaries, we shall this day mark with regret his absence from our festive board.

Sir James Meek was a highly respected and useful public servant, who, for his administrative talents in the victualling department of the Navy Board, was knighted and honoured with the Companionship of the Bath. An old member of this Society, he served on our Council for several years, and always supported our cause as long as he remained in London. Retiring from public life, he lived during the last few years at Ilfracombe in Devonshire. Being gifted with a kind heart, and possessing the most gentle manners, Sir James Meek was much beloved by all who knew him.

James Meadows Rendel, the celebrated engineer, has had such ample justice done to his merits by those who can best appreciate them, whether at the Royal Society, or the Institution of Civil Engineers, that it would not become me to weaken such descriptions by any panegyric of my own. The skill and decision which he displayed in many works, such as a cast-iron floating or suspension bridge, and numerous piers and docks, besides innumerable hydraulic operations, were crowned by his two great achievements, the harbours of refuge of Holyhead and Portland. These, in the estimation of his associates, are alone sufficient to hand down his name to

posterity with a Smeaton, a Rennie, and a Telford. Consulted also by various foreign Governments, he was associated with M. Lesseps and Mr. Charles Manby as one of the International Commission for the construction of the Canal of Suez. Mr. Rendel was born in 1799, was elected a Fellow of the Royal Society in 1843, and was, during two years, President of the Institution of Civil Engineers. His death, which occurred on the 21st of November, 1856, was deeply lamented by all his friends and associates.

Mr. John KENYON, who died in December last, was born in 1784 or 1785. He was, for some years, at Mr. Seyer's school, at the Fort, Bristol, several of his companions from which seminary have since won for themselves fame and honour in the service of literature and science. Amongst his favourite playmates were John Eagles, known in later days as the author of 'The Sketcher;' Broderip, the naturalist; and Andrew Crosse, the electrician. These schoolday friendships remained through life, unclouded by a shadow.

After Mr. Kenyon quitted the University of Cambridge, he spent some time on the Continent, but, returning to England, he formed friendships with Wordsworth, Southey, and Davy. He was not only the friend of poets, but was himself a poet; having published, a few years since, at intervals, two volumes which show considerable originality, as well as a refined and cultivated taste. These poems breathe the spirit of a mild and tolerant man, wishing well to his fellow-creatures, with a liberality something more than orthodox, and seeing all things in the sunny hue of his own generous nature.

Mr. Kenyon's appreciation of genius and talent drew around him many savans and literati of the day, among whom his genial sociability seemed to have the power of amalgamating the most dissimilar natures, and of softening asperities between individuals. He was a person to whom no man volunteered to tell the worst he knew of his neighbour. He liked to see, talk, and hear of pleasant things; but he was one who feelingly shared the sorrows of his friends. His heart was ever full of true sympathy, and his hand ever ready to assist those who required his aid. In one year he spent four thousand pounds in acts of *private* charity!

Mr. Kenyon died on the 3rd of December, 1856. All those who knew him well, feel what they have lost; those who knew him but slightly will not soon forget his ever kind and bland manners. By his noble and generous will he divided his large fortune amongst

his numerous living friends, and the children of such of his old friends who had before him "gone to the many."

Vice-Admiral Lord RADSTOCK, C.B., has very recently been taken from us. Born in 1786, and entering into the profession of his father, the well-known admiral, who won the battle off Lagos in 1797, he distinguished himself in several engagements in the Mediterranean, in the last as Captain Waldegrave, and off the Italian coast, in destroying the batteries at the mouth of the Rhone. He was afterwards made naval aide-de-camp to the Queen. Although the death of Lord Radstock seemed appallingly sudden to those who had seen him sitting at the General Meeting of the London University a few days before, yet others who, like myself, had watched with grief the rapid change in his health during the preceding months, were not unprepared for the sad event. Valuing Lord Radstock highly for his personal qualities, I can truly say that the death of this brave officer and excellent man created a very general feeling of real sorrow, as deep among his friends and acquaintances as in all those public bodies, and numerous charitable institutions, in the welfare of which he took a warm interest.

Robert ANDERSON, Surgeon, R.N., who died in June, 1856, at the early age of 38, was born in the parish of Fettercairn, Kincardineshire. Receiving his early education at the Academy of Montrose, his medical studies were carried on and completed in the University of Edinburgh. Entering the Royal Navy, as an assistant-surgeon, in 1838, he served successively in the Royal Adelaide, the Princess Charlotte flag-ship, and in the Powerful, being on board the last-mentioned ship when commanded by Sir C. Napier at the siege of Acre and during other operations on the coast of Syria. Afterwards serving upon the East India and China station in the Agincourt, Spiteful, and Dædalus, and obtaining the rank of surgeon, he again passed to the Spiteful, in which he returned from India in 1847. In the following year Mr. Anderson was appointed surgeon of H. M. S. Investigator, Captain Bird, which shared in the expedition of Sir James Clark Ross to the Arctic Seas; and in 1849, he was again selected for similar service as surgeon of H.M.S. Enterprise, Capt. Collinson, in which he continued to serve till the return of that vessel to England. With the exception of scarcely 9 months, Mr. Anderson was constantly employed afloat for a period of nearly 17 years, of which 7 were spent in Arctic service.

Besides writing extended journals, Mr. Anderson made a large

with me, that in the whole series of literature there is no work, which more feelingly developes the struggles of humanity under the most intense sufferings, or which demonstrates more strikingly, how the most appalling difficulties can be overcome by the union of a firm resolve with the never-failing resources of a bright intellect. In all these heart rending pages there is no passage which comes more home to the Englishmen who are still advocating the search for the relics of the Erebus and Terror, than that in which, after judging from the experience of his own companions, how men of our lineage may be brought to bear intense cold and trail on their existence among the Esquimaux, he thus soliloquises:—"My mind never realizes the complete catastrophe, the destruction of all Franklin's crews. I picture these to myself broken into detachments, and my mind fixes itself on one little group of some thirty, who have found the open spot of some tidal eddy, and under the teachings of an Esquimaux, or perhaps one of their own Greenland whalers, have set bravely to work and trapped the fox, speared the bear, and killed the seal, the walrus, and the whale.—*I think of them ever with hope. I sicken not to be able to reach them.*"* These generous and lofty sentiments, as I shall afterwards point out in dwelling on Lady Franklin's final search, are shared by that distinguished Arctic officer, our associate Captain Hartstene, of the United States' Navy; and they have justly awakened the hope in the breasts of many of my countrymen as well as myself, that some of the fine young fellows who sailed with Franklin may still be alive—the conviction that they must, for the honour of our country, be sought for, as well as the débris and records of the Erebus and Terror.

It was, indeed, a subject of great regret to me that when Dr. Kane visited England last autumn, this metropolis (as is usual at that season) was deserted by many of those persons who most valued his character, and that none of those attentions could then be paid to him which, had his stay amongst us been prolonged, would doubtless have been showered upon him from the Sovereign downwards. But, alas! the stroke of death was already upon him, and when I first shook his hand, I at once saw that his eagle-eye beamed forth from a wasted and all but expiring body. As geographers we were not, however, remiss in our endeavours to honour him; and although his malady prevented his attendance at our apartments to receive our heartiest welcome, I then proposed

* Kane's Arctic Expedition, vol. i. pp. 243-6.

During every phase of the rapid progress of chemistry, the gas-holder which bears his name, has maintained its place as well in the lecture-theatre, as in the laboratory of research. I have reason to believe that the arrangement of the magnificent voltaic battery, by which Davy decomposed the alkalies at the Royal Institution, was, more or less, confided to Mr. Pepys: hence, probably, originated the friendly regard in which he was held by that eminent philosopher. In the Philosophical Transactions for 1823 there is a description of a voltaic apparatus, consisting of two elements only, for electro-magnetic research, made under Mr. Pepys' directions for the London Institution.

Let me add that Mr. Pepys was always anxious to associate with those who, like himself, desired to cultivate science for its own sake. He joined our Society at its commencement. He was one of the early promoters of the London Institution, and an original Member of the Geological Society. He was also a Member, and an office-bearer in the Royal Institution, where he received the honour of one of the ten Gold Medals awarded for chemical discovery. He died at his house, Earl's Terrace, Kensington, August 17th, 1856, aged 81.

A Foreign Associate whose loss we have to deplore during the past year is Baron von HAMMER-PURGSTALL, the distinguished Oriental scholar, poet, and historian. Attracted from his earliest childhood towards the East and Eastern literature, no one has done more good, in spreading the knowledge of Oriental History and Literature amongst the literary circles of Western Europe, than the learned author of the 'History of the Ottoman Empire.' Born at Gratz, in Styria, in 1774, he entered the Oriental Academy at Vienna in 1788, where he attracted the attention of the celebrated Jenisch, whom he assisted in the preparation of his edition of 'Meninski's Lexicon.' He subsequently entered the Austrian diplomatic service as Interpreter at Constantinople, he then served in the same capacity to the British army during Abercrombie's campaign, and after acting as Attaché to the Austrian Embassy at Constantinople and as Consul in Moldavia, he was appointed Interpreter to the Vienna Chancery in 1811. From this time devotion to Oriental Literature became the leading object of his laborious life; and when he subsequently quitted the public service he pursued his favourite studies on his estates in Styria.

Some opinion of his active energy may be formed from the long

list of works which he published,* in which great research, combined with much originality, is one of the most characteristic features. But the work which has formed the basis of his European reputation was undoubtedly his 'History of the Ottoman Empire,' by far the most important work yet written on this interesting subject, though even here he has been accused of an undue bias toward the House of Austria; a bias, however, as pardonable as it is natural in such a case.

He died at Vienna on the 16th of November, 1856, in his 83rd year. His monument, which he had himself prepared forty years before his death, is placed at his own request in the cemetery of Weidling, near Kloster Neuburg. In a spirit of humble piety he addressed a letter to our Secretary not long ago, in which, after announcing the formation of a Geographical Society at Vienna and presenting to this Society a copy of his last works, he adds:—"As there is little probability that I shall be long enough in life to see the end of the printing of this work, I mention the circumstance that you may claim after my death the continuation of the work from the Imperial Academy."

J. F. WAHLBERG, the Swedish Explorer and Naturalist, already known for his travels in South Africa in 1843, was killed by an elephant on the 6th of March, 1856, on the border of a river about 200 miles N.E. of Lake Ngami, probably the River Tamunakle of Livingstone. His collections have been sent to the Cape. His companion Mr. Green had ascended the Tioghe as far as Libebe, 100 miles to the south of which he was forced to leave his boat on account of the rapids.

M. Wahlberg, who was a Member of the Royal Academy of Sciences of Stockholm, had returned to his native land in 1844, but the indomitable desire to make new discoveries in natural history led him to revisit Southern Africa in 1854. Endowed with profound knowledge in zoology and botany, M. Wahlberg, being specially characterized by a modest and unassuming manner, was truly

* Amongst his numerous publications the most important are, 'Encyclopedic View of Oriental Science,' 1804; 'Glance at Turkish Literature.' 1816; 'History of Persian Belles Lettres,' 1818; 'History of the Assassins,' 1818; 'History of the Ottoman Empire,' 1827-1834; 'History of Ottoman Poetry,' 1830-1838; 'The Mongols in Russia,' 1840; 'Geography of Arabia,' 1840; 'The Mongols in Persia,' 1843; 'Treatise on the Seals of the Arabs, Persians, and Turks,' 1849; 'Report on Reinaud's French Translation of Abulfeda's Geography,' 1849; 'Report on Printed and Lithographic Works published at Constantinople during the Years 1845-1848.'

beloved by all those who knew him, and his death at the premature age of forty-four, occasioned general sorrow throughout Sweden.

Lastly, let me close this enumeration of our deceased friends by alluding to our late honorary Foreign Member, Dr. Elisha Kent KANE; although no language of mine can express the deep regret I feel at the premature decease of this heroic young Arctic explorer.

The son of a distinguished Judge of Pennsylvania, he was born in 1822, and educated at the Universities of Virginia and Pennsylvania. Accompanying as a medical officer the first American Expedition to China, he explored the Philippines, chiefly on foot, and made maps of those islands. Having survived severe attacks of fever he examined the volcanic region of Java, and was the first to descend into the great crater of Tael and make a sketch of its interior. In this early effort, the zeal of the youth seemed to have no bounds, for he was lowered upwards of 700 feet by a bamboo rope, and from the effects of the strong sulphurous fumes was senseless when hauled up to the rim of the orifice. He not only traversed India and Ceylon, but also visited Egypt, where he was associated with Lepsius; but unfortunately lost his notes and papers, and being stricken with the plague, narrowly escaped death. Subsequently he sailed to the west coast of Africa, examined the slave factories, and proposed to make a journey to Abomey, which he never accomplished, owing to a violent fever, from which he suffered during his life—a fact which is not to be passed over without the comment, that his Arctic sufferings were *not* the cause of his decease; for he returned from his last perilous exploits in perfect health. His bravery, ability, and generosity were next conspicuously elicited in the Mexican war; and even then he endeavoured to find time to make barometrical observations on the height of Popocatepetl. Having volunteered his services as surgeon to the first American expedition in search of Franklin, he published a narrative of this voyage under De Haven. Finally, he performed those extraordinary researches beyond the head of Baffin Bay, which obtained for him our Gold Medal at the last anniversary and the unqualified admiration of all geographers. At that time, however, we had not perused those thrilling pages, which have since brought to our mind's eye the unparalleled combination of genius, with patient endurance and fortitude, which enabled this young American to save the lives of his associates. With what simplicity, what fervour, what eloquence, and what truth has he described the sufferings and perils from which he extricated his ice-bound crew! You must, indeed, all agree

collection of specimens illustrative of the natural history of the Arctic regions. Of this collection the zoological specimens were deposited in the British Museum, the dried plants being sent to Sir William Jackson Hooker at Kew, and the fossil remains to the Geological Society.

Frank, generous, and warm-hearted, esteemed alike for his professional abilities, scientific attainments, and private worth, his conduct through life exemplified a high-toned sense of honour and manly independence of character, and his premature death has caused real sorrow to his numerous friends.

Charles ELLIOTT, Esq., who died in May, 1856, at the age of 80, was a sagacious and esteemed Civil Servant of the East India Company. He always strove to promote the advancement of knowledge and geographical science, and was much beloved for his social qualities. Acting in various important capacities in Hindostan, he eventually rose to be the senior member of the Board of Revenue in Bengal, and agent to the Governor-General in the western provinces, in which capacity he proved a worthy successor of Sir Charles, afterwards Lord, Metcalfe.

Mr. Elliott had been, since the year 1832, a Fellow of the Royal Society, by whose members, as by our own, he was much esteemed; but it is specially in the Asiatic Society, of which he had been some years the Treasurer, that his loss is most felt, as evidenced by the Annual Report of that body, in which the soundness of his judgment, the integrity of his character, and the discrimination of his taste are justly extolled.

Lewis H. J. TONNA was a praiseworthy person, who formerly serving as a purser in the Royal Navy, became Secretary of the United Service Institution, and continued to carry on the business of our neighbouring establishment for many years with much efficiency and most obliging manners.

W. H. PEPYS, a native of this metropolis, was born in 1775. He succeeded to his father's trade in the Poultry as cutler and maker of surgical instruments. From his earliest years he devoted himself zealously, disinterestedly, and uninterruptedly to the advancement of science. It is now exactly half a century since Allen and Pepys communicated to the Royal Society the memorable experiment by which the identity of diamond with other known forms of the element carbon was confirmed. It was, however, as the contriver of ingenious modifications of chemical apparatus, that Mr. Pepys rendered the most signal service to scientific men.

the Resolution expressive of our admiration of his conduct, which you passed with acclamation, and which was communicated to him personally by our lamented late President, Admiral Beechey.* Hurrying away to the Havannah to seek a milder clime, Dr. Kane there terminated his noble and brilliant career. If on the subject of Arctic research our meed of praise has justly been offered to such pure philanthropists as Grinnell and Peabody, let me say that there never has been an occasion in which the people of the United States have done greater honour to themselves than by the manner in which they sought to testify their respect for the memory of their young hero Kane, when his mortal remains reached his native city of Philadelphia. "The long procession of mourners (as is recorded in the 'Philadelphia Evening Journal' of March 12), the crowded yet silent streets through which they move, the roll of muffled drums, the booming of minute guns, the tolling of passing bells, the craped flags at half mast, and all the solemn pageantry of the scene proclaim that it is no ordinary occasion which has called forth these impressive demonstrations of public respect." Agreeing entirely with this eloquent writer, that few men have ever lived, who have earned a better title to the esteem and admiration of his race, and also warmly commending to your notice the sentiment proceeding from a great commercial city of our kinsmen, "that we are not to look to the mere *utilitarian* value of Dr. Kane's labours and adventures, to the claim for that bright and unfading glory which must ever surround his name," let me say that, by re-echoing the voice of America on this occasion, England can best cherish the memory of one who dared and did such heroic deeds to rescue our lost navigators.

Having thus imperfectly glanced at the feats which our deceased Medallist had accomplished in the short life-time of thirty-five years under the impulses of humanity and science, I cannot better sum up his virtues than in the words of the divine who preached his funeral sermon†—"He has traversed the planet in its most inaccessible places, has gathered here and there a laurel from every walk of physical research in which he strayed, has gone into the thick of perilous adventure, abstracting in the spirit of philosophy, yet seeing and loving in the spirit of poesy, has returned to invest the very story of his escape with the charms of literature and art, and dying at length in the morning of his fame, is now lamented with mingled affection and pride by his country and the world."

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* *See* Geographical Proceedings, Jan. 1856.
† The Rev. C. W. Shields.

Geographical Progress.

Admiralty Surveys.—The Maritime Surveys of Britain have been steadily carried forward during the past year. I am informed by Captain Washington, R.N., Hydrographer to the Navy, the worthy successor of Admiral Sir F. Beaufort, that twenty different surveying parties are in active service, about one-half of which are employed on our own coasts, the remainder in the Colonies, the Mediterranean, the River Plate, the South-western Pacific, and the coast of China.

England.—To begin with operations at home. Sanitary measures connected with the metropolis have necessitated a fresh survey of the upper portion of the River Thames. At the instance of the First Commissioner of Works, Commanders Burstal and Cudlip, in August last, began a minute survey of the river from London Bridge upwards to Putney, a distance of about 7½ miles, running again the identical lines of sections, at about 700 feet apart, taken by Giles in 1823, in order to institute a comparison as to the change in the bed of the river. These soundings have been laid down on the sheets of the Ordnance Survey of London on a scale of 60 inches to a statute mile, a scale sufficiently large to show minutely every feature.

The result, as shown in Commander Burstal's Report and Transverse Sections, is that since the year 1823 the average deepening of the bed has been about 4 feet from Putney to Westminster Bridge, and about 6 feet from Westminster to London Bridge; but this average by no means shows the extent of the scour consequent on the removal of Old London Bridge in 1832, as, for instance, near the Grosvenor Canal there are places where the deepening has been 13 feet; at Westminster Bridge 10 feet; at Hungerford 11½ feet; and above Southwark Bridge 14 feet. These figures are highly instructive, as showing the improvement which might be expected in other rivers in this country, if the old fashioned bridges which now act as dams were removed, as in the Tyne, the Slaney, and the Liffey; and if Newcastle, Wexford, and Cork Bridges were rebuilt with proper openings.

The sounding of the upper part of the Thames will be continued in sections of 150 feet apart from Putney to near the Thames Tunnel, about 1½ miles below London Bridge. At that point it has been taken up by Commander Cudlip, who is now engaged sounding Greenwich, Blackwall, and Woolwich Reaches, the plans of which, it may be hoped, will form the foundation for a systematic and ex-

tensive dredging of all the upper part of the river so soon as the Thames Conservancy Board can be brought into action.

On the East Coast of England, Mr. E. K. Calver has revised all the charts during the past year, and inserted the changes that have taken place during the last ten years, and especially in the frequented anchorages of Yarmouth and Lowestoft Roads. He has also prepared the Sailing Directions for this coast and for the opposite shore of Belgium, Holland, and Jutland up to the Skaw, which will form Parts III. and IV. of the 'North Sea Pilot' now in preparation.

On the South Coast of England, the surveying party under Commander Cox and Messrs. Usborne and Davis have just completed a careful examination of Plymouth Sound, whence it appears that that well-known roadstead has not silted up in any appreciable degree since the breakwater was placed across its entrance—an interval of five and forty years—the first stone having been deposited in August, 1812.

In Cornwall, Captain Williams and Mr. Wells have completed the survey of the Fowey River, from Lostwithiel to the sea, and a portion of the coast from Fowey to the Dodman.

In the Bristol Channel, Commander Aldridge and Mr. Hall have surveyed Caldy and Tenby Roads, where they have discovered and mapped several new rocks and shoals not before pointed out.

Scotland.—In the Frith of Forth, Lieut. Thomas and Mr. Sutton have surveyed the coast of Haddington by Dunbar and St. Abb's Head to Coldingham, and have completed the outer soundings to the eastward of the Isle of May, which mark the approach to this extensive estuary.

Farther north, a detailed plan of the Bay and Harbour of Wick and Pulteney Town has recently been published at the Admiralty, preparatory, we trust, to the laying out of a Harbour of Refuge on that exposed coast, where in an easterly gale the 1000 herring-boats that annually fish out of Wick have no shelter to run for. The numbers of valuable lives at stake in these important fisheries imperatively demand that a suitable harbour in the most appropriate spot should be constructed without further loss of time.*

The Sailing Directions for the Orkneys and Shetland, originally drawn up by the late Commander Thomas, and revised and corrected by Mr. E. K. Calver, have been published during the past year, and

* A subject of considerable importance to physical geographers as connected with the harbour of Wick will presently be discussed (*see* Physical Geography).

they form Part I. of the four parts of the 'North Sea Pilot,' the whole of which work will, we trust, be in the hands of the mariner before the close of the present year.

On the north-west coast of Scotland, Commander Wood has surveyed a small portion of Skye, while Mr. Jeffery has mapped Loch Nevis. Several detached Charts also of these coasts have been published during the past year, as lochs Broom, Ewe, Hourn, Gairloch, Edrachilles Bay, including the lochs, Raasay and Inner Sound, Sounds of Seil, Mull, Sleat and Kyle Rhea.

In Argyleshire, Commanders Bedford and Creyke, and Mr. Bourchier, have added to our knowledge of the north shores of the isle of Mull, and have re-examined Oban bay.

In the Hebrides some soundings off the isle of Lewis have been obtained by Captain Otter and his staff in the Porcupine; and during the present season a survey of the Sound of Harris will, it is hoped, prove to the mariner whether, in case of need, he may safely run for that strait.

Ireland.—On the north-eastern shore of Ireland, Messrs. Hoskyn, Aird, and Yule, have completed the examination of Belfast Harbour, and made patent the improvements that public spirit, combined with good engineering, has within the last few years effected in that port. They have also mapped a portion of the coast of Antrim, from Garrow Point to Ballygally Head, the fine natural harbour of Lough Larne, and the artificial packet-station of Donaghadee.

In Wexford, on the south-eastern coast, Captain Frazer and Lieut. Bullock have re-examined the channels and banks at the entrance of that harbour, where some remarkable changes have taken place, and made a detailed survey of the River Slaney up to the town of Enniscorthy, preparatory, we trust, to some extensive improvements in the channel—a measure which could not fail to be attended with corresponding benefit to the fertile country which that river drains.

In Donegal, on the north-west coast, Captain Bedford and Lieut. Horner have completed elaborate plans of Sheep Haven and Mulross Bay. By permission of the Admiralty, these plans have been exhibited at our evening meetings, and I am sure you will all willingly join with me in acknowledging the apparent fidelity and beauty with which the features of these natural inlets have been portrayed.

In Kerry, on the south-western coast, Commanders Beechey and Edye, with Mr. W. B. Calver, have mapped a portion of Tralee and Brandon bays, while Mr. McDougall has surveyed Dingle and Ventry harbours, which lie on the southern side of the same bold projecting

peninsula of Kerry, and which, having twice examined myself, I can testify to be the most interesting part of Ireland, in showing certain relations of the Silurian to the Devonian rocks, which can nowhere else be seen in the sister island.

The neighbourhood of this immediate coast, on the south side of Dingle Bay, is about to become a site of much interest and importance, the small island of Valentia having been selected as the Eastern or European terminus of that Atlantic Electric Telegraph Cable, on which I shall presently enlarge, as destined to unite the two continents in stricter bonds of amity and good fellowship.

It must interest my hearers to know that Lieut. Dayman, R.N., who was a companion of Sir James Ross in his voyage to the Antarctic regions, will leave England in a few days in command of the Cyclops steamer, to carry a line of deep sea soundings across the Atlantic, from Valentia to Trinity Bay in Newfoundland. The vessel is furnished with some 20,000 fathoms of line of different sizes, a portion being of silk, with an abundant supply of sounding machines, and a steam-engine on deck on purpose to heave in and reel up the line, and we may fairly hope, ere long, to have a second continuous line of soundings across the Atlantic, and know the nature of the bed on which the Telegraph Cable will have to repose.

With the authority of our Council, I took advantage of the announcement of this expedition, so deeply interesting to naturalists, and suggested to the Hydrographer that, the opportunity being one which might never recur of obtaining an accurate acquaintance with submarine life at great depths, a competent naturalist might be allowed to accompany the survey, or that in any case the medical officer of the Cyclops might be so instructed as to record accurately the phenomena.

Black Sea.—In quitting our home for foreign shores, the survey of the Delta of the Danube claims precedence, and is entitled, in the opinion of my eminent friend Captain Washington, to our warmest acknowledgments for the admirable manner in which it has been carried out by Lieut. Wilkinson, R.N., under the orders of Captain Spratt, R.N., C.B., whose report on Fidonisi, or Serpent Island, has been communicated to the Society by the Admiralty. This recent survey of the streams which form the delta of the Danube is comprised in several charts, filled almost to overflowing with soundings of the three principal branches, Ochákov or Kilia to the north, the Súlina in the centre, and the St. George or Khedriliz to the south. These plans are now lying on the table before us, and

they bespeak for themselves our admiration of the beauty of their execution and of the unflinching perseverance with which these services were accomplished in the short period of a few months of last autumn.

Sea of Azov.—During the present session, we have received from our associate, Captain Sherard Osborn, R.N. (so honourably known to us by his Arctic explorations and writings), an interesting communication on the geography of the Sea of Azov, the Putrid Sea, and the adjacent coasts, with remarks on their commercial capabilities. As the hydrographical features of this area are peculiarly deserving of notice, I naturally treat of them under the head of the British Naval Surveys. In no part deeper than 40 feet, the centre of this sea forms a flat basin 55 miles in extent from east to west, and 35 from north to south, with an inclination from the edge of this level to the coast of about a foot per mile, increasing somewhat in abruptness as the water shallows.

The sandy spits, which are so remarkable, and are attributed by the author to volcanic action, afford a shelter against easterly winds, but there is no protection in any part of the sea against those from the west. When this communication was read, I confirmed, from personal observation, the accuracy of Captain Osborn's remarks upon the rapid accumulation of sand on these spits; and the fact of their being precipitous on the east side and shelving on the west is a good addition to our knowledge. There can be no doubt, however, that the base of some of them, near the ports, consists of knolls formed by the discharge of ballast from trading-vessels, thus forming nuclei for fresh alluvial deposits, which, after a short time, become connected together; and unless means be adopted for checking this system of accumulation, the Sea will, before long, be hardly navigable in certain places.

The assertion of M. Taitbout de Marigny, that there is little current in the Sea of Azov, is shown by Captain Osborn to be an error; the existence of currents being indicated, not only by the influence of the winds on the motion of the water, but also being plainly manifested by the outflow from the delta of the Don, the Sivash, and the rivers between Taman and Kamisheva. The physical features of the Spit of Arabat, and of the Sivash or Putrid Sea, are described from observations made, under very difficult circumstances, during the late war.

Mediterranean and Archipelago.—On a recent route from Malta to the Dardanelles, Captain Spratt had an opportunity of obtaining a

line of deep sea soundings between that island and Candia, in which the greatest depth was 2170 fathoms. The section is very striking; for a distance of 50 miles to the eastward of Malta the depth does not exceed 100 fathoms, after which it drops almost suddenly to 1500 and 2000 fathoms, and continues near that level *below* the surface of the sea until within 20 miles of the east end of Candia or Crete, where the White Mountains and Mount Ida rise up to a nearly equal height *above* the level of the sea. Between Crete and the Dardanelles the greatest depth is 1110 fathoms.

Africa.—On the North Coast of Egypt, Commander Mansell in the Tartarus, with his assistants, Lieut. Brooker and Mr. Skead, have completed a survey of the coast from Damietta eastward to El Araish, an admirable plan of the port of Alexandria, and a survey of the bay of Suez, a place daily becoming of more importance as our direct mail communication extends to India, China, and Australia.

Taking advantage of fine weather and a calm sea, Captain Mansell has lately run a line of soundings between Alexandria and the island of Rhodes. From the coast of Egypt the depths gradually increase until at 70 miles off they reach 1000 fathoms, at 110 miles 1600 fathoms, which is the maximum depth of this portion of the basin of the Levant. The above soundings are of great interest to the geologist as well as the geographer, and do much credit to the officers who, overcoming many difficulties, have succeeded in carrying them out.

While on this subject, I should mention that, in October, 1856 Messrs. Delamanche and Ploix, Ingénieurs Hydrographes of the French Imperial Marine, carried a line of soundings across the Mediterranean between Port Vendres in France to Algiers, in which the greatest depth was about the same as in the Levant, namely 1600 fathoms.

South Africa.—In the Cape Colony the only addition we have to record is the completion by Mr. Francis Skead of the survey of Port Natal, begun by Lieut. Dayman, R.N., in 1855. I cannot here but repeat the words of my predecessor in this Chair, that both the land survey of the colony and that of the coasts ought to be pressed forward. Every year that they are delayed bars the progress of the settlers, hinders the development of the resources of the district, and is attended with loss to the colonial exchequer.

China Seas.—In the last anniversary Address a hope was expressed that Captain Bate, the surveyor of the island of Paláwan, might be more usefully employed in China than in merely commanding a

cruizing ship. It is gratifying to be able to state, that a thoroughly equipped surveying vessel, the Actæon, accompanied by a small steam tender the Dove, under command of Lieut. Bullock, has sailed for those seas, and as soon as the present unfortunate differences with China are settled, Captain Bate will resume his survey on such parts of the coast as most require it. In the meantime, Messrs. Richards and Inskip in the Saracen will proceed forthwith to make a detailed survey of the dangerous shoal *As Pratas* (lying only 60 leagues to the E.S.E. of our own colony at Hong Kong), with a view to the construction of a lighthouse upon that extensive coral reef which has caused the wreck of so many vessels.

Siam.—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards and Inskip have visited Bangkok, where they experienced great attention and assistance from the enlightened ruler of that country; they have rectified the positions of several islands and of many of the headlands and capes on the western as well as on the eastern shore of the gulf.

Tartary.—Farther north on the coast of Tartary the officers of one of our cruizing vessels, the Barracouta, have examined a harbour, which they have named after that ship, and in which the Russian frigate Pallas had taken refuge. This capacious harbour is the same as that called Imperadorski Gavan, or Port Imperial, by the Russians, and lies about 130 miles south of Castries Bay.

In the Admiralty chart of these regions the whole course of the Amúr has been laid down from the astronomical observations made by Peschurof in 1855, which render the river quite a new feature in our maps. The details of these observations are given in the 'Morskoi Sbornik,' or Russian Nautical Magazine, for March and May, 1857. They are also to be found in that excellent geographical periodical, 'Mittheilungen,' edited by Dr. A. Petermann at Gotha.

New Zealand.—The publication of the detailed charts of the coasts and harbours of this group of islands advances rapidly; the past year has produced four coast charts, on the scale of 4 miles to an inch, and 11 plans of harbours and rivers, including Auckland, Waitemata, Taupanaa, Whangaroa, Hokianga, &c., being a portion of the ten years' labour of Captains Stokes and Drury, with Messrs. G. Richards, Frederick J. O. Evans, J. H. Kerr, &c., and we trust that before the close of the next year every item of information we possess of these islands will be in the hands of the mariner.

Pacific Ocean.—Captain Denham in the Herald continues his

useful labours in the south-western Pacific. During the past year he has surveyed several islands of the Fiji group, as Angau, Matuka, Mbatiki, Moala, and has swept from the charts the imaginary Underwood and Rosaretta reefs. Assistant-Surgeon Macdonald of the Herald has made a journey into the interior of the island *Viti Levu*, which, with a track chart of the route, has been communicated to the Society by the Admiralty. Various views of headlands and characteristic sketches of the scenery and of the natives have been made by Mr. Glen Wilson, artist to the expedition.

A chart of the Pacific Ocean, in 12 sheets, on the scale of $\frac{5}{10}$ths of an inch to a degree, has recently been published by the Admiralty, in which the curves of equal variation have been carefully laid down for the year 1855, by Mr. Frederick J. O. Evans, chief of the Compass Observatory. The whole forms a valuable contribution to hydrography, and physical geography.

America.—Pursuing our imaginary eastern route, we have the gratification to announce that a well organized expedition, under the command of Captain George Richards, R.N., favourably known as a fellow-labourer with Captain Stokes in the survey of New Zealand, has sailed for Vancouver Island, to determine, in conjunction with the United States Commissioners, the boundary, as laid down by treaty, between the British and American possessions. This expedition cannot but be productive of a good harvest of geographical information.

In the Rio de la Plata, Lieut. Sidney, with slight means at his command, has fixed the position of the north edge of the English Bank, lying some 10 miles south of Monte Video; he has completed a detailed plan of the river and outer roadstead of Buenos Ayres, and has partially examined the lower course of the Uruguay.

On the coast of Brazil, Lieut. Parish, R.N., has furnished plans of several small harbours and otherwise improved our charts, while a more complete Sailing Directory, founded on the labours of Baron Roussin, is in course of preparation by Rear-Admiral FitzRoy.

West Indies.—The additions to geography in the West Indies consist in a survey of the island of Santa Cruz, and the harbour of Christianstadt, by Messrs. Parsons and Dillon; a re-examination of the harbour of Grey Town by Mr. Scott, master of H.M.S. Impérieuse, and some new coral patches discovered among the Pearl Cays.

Nova Scotia.—In the Bay of Fundy, Commander Shortland, with Lieut. Scott and Mr. Scarnell, has completed the soundings in the

vicinity of the Grand Manan islands at the entrance of the Bay, and has mapped a further portion of the south-western coast of Nova Scotia.

Gulf of St. Lawrence.—Rear-Admiral Bayfield, in succeeding to his flag, retires from the command of the survey of the Gulf and River St. Lawrence, on which extensive work he has been engaged upwards of a quarter of a century. It has fallen to the lot of few officers to originate and bring to a close, after so many years, so extended and laborious a work, where the Surveyor had to contend with a rigorous climate in winter and fogs in the spring and autumn, leaving but a short season in which outdoor work could be executed. It has, however, been done in a masterly manner, as more than 100 published charts and plans, complete sailing directions, and a valuable table of Geographical Positions connected with Quebec, Halifax, and Boston, most fully testify. I am sure you will all join cordially with me in wishing many years of honourable repose to the gallant Admiral whose labours have bestowed so valuable a boon on the mariner, and whose previous observations, let me add, on various glacial phenomena, including the transport of blocks by the ices of the St. Lawrence, have been of signal service to geological science.

Commander Orlebar, the former chief assistant, succeeds to the charge of the survey, which will be continued along the eastern shores of the peninsula of Nova Scotia.

Ordnance Survey of Great Britain.—No change, as I am informed by the able superintendent of the Ordnance Map Office, Lieut.-Colonel James, has been made in the orders relative to the survey during the last year, and the progress in the north of England and Scotland for the twelve months ending on the 31st of March has been very great, amounting to 1,394,409 acres, finished in every respect for publication.

The publication of the following counties has been finished within the last year, viz Yorkshire, Fifeshire, Kinross, and Linlithgowshire.

The publication of the following counties is in progress, viz. Durham, Ayrshire, Dumfriesshire, Renfrewshire, and Berwickshire.

The survey of the following counties has been finished during the last year, viz. Berwickshire and Selkirkshire (nearly).

The Survey is in progress in the following counties—Northumberland, Westmoreland, Lanarkshire, Roxburghshire, Forfarshire, and Perthshire.

The surveys of the large towns of Glasgow and Dundee and many others have also been finished in the last year.

An outline map of London, on the scale of 6 inches to a mile, has also been made within the last few months. The one-inch map proceeds *pari passu* with the maps on the larger scale, and great advantage is derived from the system of making all the reductions from the larger to the smaller scales by the aid of photography; indeed, Lieut.-Colonel James expects to be able to get the ground sketched on the 6-inch impressions in such a way that, when reduced by photography, the reduced drawing will be the fac-simile of what the engraver is to produce.

The general reduction in the estimates of the War Department consequent upon the return of peace, has led to the reduction of the proposed grant for the survey for the present year to the extent of 27,000*l.*, and, as a consequence, the surveying force has been reduced to the extent of 3 officers and 600 men, the parties destined for the surveys of Cumberland, Stirlingshire, and the Western Hebrides, having been broken up.

Geological Survey of the United Kingdom.—Having directed the Geological Survey of the United Kingdom during the last two years, it becomes me to say a few words on the progress of a branch of the public service so intimately connected with geographical science. The first object contemplated by my predecessor, Sir Henry de la Beche, in founding this establishment, was so to colour the Ordnance or Geographical Maps as to convey a clear idea of the rocks beneath the surface in all parts of the kingdom, and further to illustrate such structural character by coloured sections, both vertical and horizontal. In this way, not only the order and succession of the strata are delineated, but the dislocations they have undergone are marked; whilst all the rocks of igneous origin which had been intruded among them are clearly defined.

As the work advanced, it became desirable, that these surveys and sections should be accompanied by volumes explanatory of the nature of the rocks, and their mineral and zoological distinctions, with descriptions and figures of the imbedded organic remains. To render the whole subject intelligible, it further became requisite so to expose the fossils collected by the surveyors, that the public might be led to understand the *rationale* upon which the maps, sections, and descriptions were founded. Thus, a

Museum having been established on a small scale in Craig's Court, with an attached experimental chemist and laboratory, it was decided by Sir Robert Peel, at the suggestion of my lamented predecessor, that the whole establishment should be enlarged and placed on a footing similar to that on which continental countries sustain such mineral and geological surveys. Then arose the Museum in Jermyn-street, which, from its origin, was constituted to be not only the central Map Office of the Geological Survey, where the fieldwork of the surveyors is laid down, compared, and issued to the public, but also a place where the proofs of the accuracy of such works might be accessible to every one. Collocating in it specimens of the building stones, marbles, granites, &c., of various districts, this museum was rendered still more useful by the addition of a Mining Record Office, in which plans of all the mines, abandoned or existing, are, as far as practicable, registered and kept, and various statistical documents brought together to show the whole mineral produce of the country. Lastly, to attain the same position as is occupied by the mining schools of France, Germany, and other countries, it was resolved to constitute within the new building a regular School of Mines, and to carry out in it (which had nowhere been previously attempted in Britain) a complete course of instruction in those physical sciences on which geology is based. The eminence of the gentlemen with whom I am associated in Jermyn-street is the best guarantee for the success of an establishment in which youths can be thoroughly and systematically instructed in physics, mechanics, chemistry, metallurgy, mineralogy, mining, and geology.

My hearers will therefore understand, that the Jermyn-street establishment, having for its basis the geological and mineral illustration of the British isles, performs, at the same time, all the other duties to which brief allusion is here made, and must be viewed as a truly useful national undertaking.

The maps, which have been completed and published on the 1-inch scale with 6-inch horizontal sections, relate to the whole of Wales, all the south-western districts, and a great portion of the central counties of England; whilst vast tracts in Ireland have been surveyed and the information registered on maps of the 6-inch scale, and four counties published on the new 1-inch maps.

In Scotland also, progress has been made commensurate with the present force of surveyors, and there, as in Ireland, the data are

registered on the maps of the 6-inch scale, so as to be ready to be published, when the maps of the districts under review shall have been completed.

I have great satisfaction in informing you that, as the Geological Survey proceeds, the public is rapidly becoming aware of its value. The sale of the maps and sections has recently been doubled; so that, if the present demand should continue, the sale of this year will exceed 5000 sheets.

As no men of science are more directly concerned with the successful progress of the Ordnance Survey of the country, than the geologists who have to work out the subterranean phenomena upon the geographical features there laid down, so it may naturally be expected, that I should express my opinion on the *quæstio vexata* which has been so much agitated in Parliament, viz. the best scale for publication.

Most persons will agree with me in what I have long contended for, that a 1-inch scale * is large enough for the purposes of a general map, and any one who doubts it should visit the Museum in Jermyn-street, and there see how vast a portion of a lofty hall is required to exhibit at one view that portion only which is geologically finished, or Wales and the half of England. But, whilst for the general purposes of the public, this scale (which is larger than that of the *published* maps of France and other foreign countries) is quite sufficient, it is my duty to say, that for several objects of the geological surveyor the 6-inch map is often of higher value. This latter scale was applied to Ireland, because it was supposed to be the smallest measure on which every essential feature of a tract, whether natural or artificial, could be laid down. It follows therefore that, in availing himself of this map, the field geologist has at hand a datum-point for every observation; particularly if it be furnished with contour lines marking the relative altitudes. In short, he can register, with an accuracy unattainable, except on such a scale, every outcrop, fold, or break of the beds; and hence,

* *See* Memorial resulting from a resolution which I moved at the fourth or Edinburgh Meeting of the British Association for the Advancement of Science (1834) and presented to the Chancellor of the Exchequer (now Lord Monteagle) in May, 1835. Report of the British Association, Proceedings of the Meeting, p. xxxvi. This document, which showed the deplorable state of the Geography of my native country at that time, was also printed by order of the House of Commons. Subsequently, when President of this Society in 1853, I again made a strong appeal touching the neglect of Scottish Geography. — Journal of the Royal Geog. Soc., Vol. XXIII., President's Address, p. lxxxix.

independently of the advancement of the theoretical branches of his subject, and the acquirement of a sound knowledge of the substrata, he can essentially serve the purposes of the mining proprietor.

Having always held (as I still hold) that the 1-inch map is *the* publication which the country most requires, I am bound to record that my conviction of the utility of the 6-inch scale, for certain geological and mining purposes, is the result of an examination of the able surveys conducted on maps of that size under the guidance of Mr. J. Beete Jukes in Ireland and of Professor Ramsay in Scotland. I trust, therefore, that this larger scale will be maintained coordinately with the smaller one.*

PHYSICAL GEOGRAPHY.

Observations on the Summit of the Peak of Teneriffe.—Having spoken of the progress of practical geography at home and in our distant Naval Surveys, it becomes my agreeable duty to notice the uncommon British expedition proposed and executed last year by Professor Piazzi Smyth, Astronomer-Royal for Scotland. During the last five years this zealous observer had endeavoured to impress upon Government, founded on his experience at the Cape of Good Hope, the eligibility of rising above the grosser stratum of our atmosphere, and had pointed to the facilities offered by the Peak of Teneriffe.

The Admiralty having finally listened to his arguments, and acceded to his moderate estimate of expense, Mr. H. Pattinson of Newcastle-on-Tyne added a powerful telescope to his instruments; and our associate Mr. Robert Stephenson generously lent him his yacht for the whole voyage out from Southampton and home; whilst several leading scientific men were glad to have their favourite experiments tried in so novel a position.

The Professor established his first station on the Peak of Teneriffe, from the 14th of July to the 20th of August, amid the old trachytic lavas of the volcano, on a spot called Guajara, 8843 feet

* I say nothing here of the Survey on the 25-inch scale which is in progress in the richer tracts of Scotland and the north of England, because it contains no delineation of the natural features of the ground. Such surveys are not to be viewed as *Maps*, but simply as cadastral plans, which many eminent public men consider to be of the highest value for the conveyance and settlement of property, &c. They are also highly useful as Fortification Plans, and for *all such purposes of detail* they are, in my opinion, preferable to any smaller surveys.

above the sea. Here, above all the clouds, except a few scirri, which appeared about one day in five, he mounted the five-feet Sheepshanks equatorial, which revealed test objects of three magnitudes smaller than it had ever shown before. In the apparatus supplied by Prof. Stokes, the increase of black lines was remarkable as the sun's zenith distance increased, and there was a growth of the red end of the spectrum. The dryness was so great, that while the country below was covered by a dense bed of clouds, the average of the dew point was 40°. The sun's radiation exceeded the graduation of the instruments, the temperature reading $180° + x$. The moon's radiation became perfectly sensible to Mr. Gassiot's thermo-multiplier, showing it to amount to one-third of the heat of a candle at the distance of 15 feet.

The second station was at Alta Vista, 10,710 feet above the sea; and there the twelve feet Pattinson equatorial was finally mounted, and by its space-penetrating power, stars of the sixteenth magnitude were easily seen, and the fractions of a second in the distance of double stars were defined. The colour also was observed. Only on one occasion could red prominences in the sun be suspected. Many other branches of observation were included, and minutely reported to the Admiralty. The breaking up of the season, after the middle of September, rendered a hasty retreat necessary, but with the conviction of a yet higher station being desirable in future, if only to get above the persecuting dust, a convenient site was marked at the height of 11,700 feet above the sea, still accessible to mules, if a little money were spent in removing some rugged blocks of lava.

Specific Gravity of Sea-water.—Our attention was recently called to the condition of the sea-water on the West Coast of Africa, when it was rendered more or less turbid to the distance of many miles from the mouth of the great river Congo or Zaire. Dr. James Campbell, F.R.G.S., of H. M. ship Plumper, observing this phenomenon, had the precaution to collect and send home, with a notice, various samples of sea-water taken at various distances from the shore, noting the day of collection, the latitude and longitude, and the temperature of the water and air at each of these spots. It became therefore a subject of interest to determine, if possible, the nature of the discolouring matter, and the relative specific gravity of the water in the different localities. Mr. Henry M. Witt, of the Government School of Mines, has had the goodness to examine, at my request, these samples of water, and his account of them will be published in

our next Volume. Unluckily the quantities of the water sent home were far too small to admit of rigid chemical analysis. Thus, in regard to the discolouring matter, it could only be ascertained, that it was a suspended, light, yellowish, flocculent substance, which affected the usual green colour of the sea, and is in all probability of organic (vegetable?) origin. The specific gravity, however, of the water has been determined, and the result, as will be shown in a table, confirms the observations of Mulder and Dr. John Davy, of a diminution of such gravity in sea-water as it approaches the mouths of rivers. Mr. Witt further mentions the results of other observers, and states, that after a series of experiments, in a voyage from Southampton to Bombay, MM. Adolf and Hermann Schlagintweit give 1·0277 as the mean specific gravity of the Atlantic; whilst our late member, Admiral Philip King, found the mean specific gravity of the Pacific to be 1·02648 between 10° and 40° S. lat., and 1·02613 between 40° and 60° S. lat. It would, therefore, appear probable, that whilst the density of inland seas, such as the Mediterranean, is higher than that of the broad oceans, the Atlantic will be found to have a higher specific gravity than the Pacific—a point, however, which ought to be ascertained accurately by numerous determinations of the quantity of saline matter in the waters of each of these oceans.—(*See* Smyth's 'Mediterranean,' p. 131.)

Permanent Effects of Winds and Currents.—By perseveringly observing the phenomena attendant upon the wear and tear of the coast of Caithness, and by pondering upon the changes that have taken place in and about the harbour of Wick, Mr. John Cleghorn, of that town, after pointing out that the south-west side of the harbour was comparatively shallow and its north-east deep, extended this observation, and found it to be true as respected other bays of the east coast of Scotland. The same observer, who had previously roused attention to the ruinous effects of the present system of fishing, in destroying the breed of herrings, and who has also written an able notice upon the formation of rock basins by the action of waves upon large stones (both derived from his own examination), was, in this case, led to believe that the natural cause affecting Wick harbour has been the long-continued prevalence of the south-west wind, which produced waves that had worn away the north-eastern headlands into precipices, and had sent back the débris by a counter or reflux current, which necessarily tended to shoal up the opposite or south-western side of the bay.

Consulting Mr. A. Keith Johnston, of Edinburgh, who had devoted many years to the accumulation of such data, Mr. Cleghorn found that his view of the prevailing south-west wind was correct, as respected all the region of the globe north of N. lat. 30°; and hence he is naturally disposed to generalize the application of facts which are not only curious, but of value to the practical civil engineer.

An acquaintance with these data may, indeed, stimulate physical geographers to look into the general effects which have resulted from the continuance during a very long period of the same great dynamic force. In the mean time much inquiry seems to be called for. Mr. Findlay, to whom we are so much indebted for a perspicuous collection of all observations on tides and currents, whilst agreeing to the chief datum of Mr. Cleghorn, that the north-eastern shore ought, in our latitudes, to be the deepest, and the south-west shore the shallower, as due to the south-west wind governing the direction of waves which frequently have their origin at a distance of 1000 to 1800 miles from their effects, is not yet convinced of the truth of the other portion of the inference of Mr. Cleghorn, that the débris of the worn side is translated by a counter current towards the south-west. He reminds me, in a letter to myself, that the two circulating tidal systems, demonstrated by Dr. Whewell to exist in the North Sea, seem to explain the drift of silt from the extreme eastern shores of Britain to the Goodwin Sands and the Flemish Banks; whilst the débris abstracted from the south-west coast finds its way to the heads of the flow-beds in Morecambe Bay and the Straits of Dover, as shown by the tidal diagrams of Admiral Beechey.

As there is evidently conflicting evidence on this obscure part of the subject, and as the "Flot du Fond" of M. Emy * has been much disputed (M. Givry contending that wind affects the sea to no greater a depth than 10 fathoms, whilst Captain M. White extends that influence to 60 or 70 fathoms), we see how much additional observation is required before we can definitely judge the question with precision. If, by the examination of many other localities, the views of Mr. Cleghorn should be sustained, the generalization will be essentially serviceable in its practical application, and we may then be able to define the origin and progress of many large collections of drifted and alluvial matter, whether accumulated in

* Du Mouvement des Eaux, &c. Par le Colonel A. R. Emy. Paris, 1831.

remote periods, or now in progress. Once let the two points of this simple view be established, and we may extend the reasoning to those periods of change in the surface of the globe when, after the former sea-bottoms were raised up to constitute the mass of the present continents, great lines of cliff were formed in given directions, facing, as it were, broad, low tracts, covered by marine drift.

"How is it," said a native of the country to me, when I was formerly travelling in Russia, "that the Volga has always its right bank lofty and precipitous, and its left bank low?" The question was startling; but, in examining the rocks of the mightiest of European streams, I found that it was true, though the course of the stream varied more than the fourth of a circle in the two main directions which it followed. Descending along the high or right bank from Nijny Novogorod to Kazan, I did, indeed, speculate upon its having been the ancient shore of a sea which covered the lower country to the north; and if we adopt the law that the precipitous face was the side exposed to the waves, the prevalent wind in that region, at a period antecedent to the creation of the human race, must have proceeded from the north.

This phenomenon, of a precipitous face exposed to the north, continues from the confluence of the Oka and Volga on the west, to Kazan on the east, a distance of upwards of 200 miles. Throughout that space, headlands of red sandstone and marls stand out on the right bank, opposed, in a striking manner, to the low country on the left or northern shore. Again, whilst not a single northern erratic block is to be found to the south of this portion of the Volga, the low country, at a little distance to the north, is covered by those great erratics, all of which, as geologists know, were transported by ice-floes from the north, and dropped upon the bottom of a former sea. We may, therefore, naturally infer, that this east and west line of cliffs was formed during the icy period, when the great northern currents prevailed, the waves of which lashed against the hills extending from Nijny Novogorod by Tcheboksar and Sviask to Kazan.

On the other hand, when the same great stream turns abruptly to the S., and trends even to the S.S.W., a line of cliffs, still on the right bank, ranges from the bold headland of Carboniferous Limestone near Samara, and extends for about 550 miles to near Tzaritzin, facing the E.S.E. and S.E. Now, it is to be noted that, in front of this line of cliff, the low country on the opposite bank of the

stream was unquestionably occupied, at a very modern date, by a great internal sea, the desiccated shells of which, now lying on the steppes, are of the same species as those still living in the Caspian.

In these dried-up bottoms of a vaster Caspian, or what I termed "Aralo-Caspian," * the erratic blocks of the north are no longer to be seen, and we are in a region where the right bank of the Volga has been fashioned into cliffs by the agency of winds and currents proceeding from a point of the compass very different indeed from that whence the winds and waves proceeded, when the cliffs ranging from Nijny to Kazan were formed.

In thus cautiously reasoning from data which are absolutely in our possession, and by extending the application of existing causes, we may be capable of determining the direction of the prevailing winds in different epochs of the earth's formation, and even in very remote geological periods; for many of the escarpments of ancient stratified rocks have doubtless had their prevalent direction of cliffs formed by the breakers and atmospheric agency of by-gone periods.†

Again, as we know that the ripples on the surface of the sands of the present shores indicate the direction of the waves, so when a sufficient number of observations shall have been made by Mr. Sorby and others ‡ upon the ripple-marks which have been preserved in the successive surfaces of stone, we shall be enabled to infer the direction in which the prevailing winds blew during each former geological period!

But I am now, perhaps, realizing too demonstratively for all my hearers, the truth of the incontrovertible axiom, that physical geography and geology are inseparable scientific twins.

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* *See* 'Russia in Europe and the Ural Mountains,' p. 299, and the Geological Map, on which are noted the two points here contrasted, viz.—the southern range of the northern erratic blocks and the western boundary of the Aralo-Caspian Deposit.

† *See* the account of the formation of the '*Straits of Malvern*,' in Murchison's 'Silurian System,' p. 530; and consult Professor Ramsay's writings on this point in his 'Memoir on the Denudation of England and Wales,' 'Memoirs of the Geological Survey of England and Wales,' vol. i. p. 333.

‡ *See* 'Edinburgh Phil. Mag.,' New Series, vol. iii., p. 112, 1856. Mr. Sorby has particularly distinguished himself by his numerous observations on this subject, and has also explained his views by ingeniously contrived instruments of his own invention.

USEFUL INVENTIONS.

The Atlantic Telegraph.—At the head of the list of useful inventions in the course of application, must unquestionably be placed the Great Atlantic Electric Telegraph.

The series of nautical observations recommended for statistical purposes, in reference to the meteorology and physical geography of the sea, by the Maritime Congress held in Brussels in 1853, followed by the co-operation therein of the mercantile and governmental navies of the countries there represented; the subsequent writings and investigations of Lieut. Maury, U.S.N., founded largely upon those observations, and the soundings of Lieut. Berryman and others in the Atlantic Ocean, have determined the path which seems at present to be the only practicable one for successfully submerging a telegraphic cable beneath that sea, and so uniting Britain and America.

This path would appear to lie, in a straight line, nearly due east and west, between 48° and 55° N. latitude from the coast of Ireland to that of Newfoundland, along the course of which the depth of water is believed to be nowhere greater than 12,000 feet. The depth descends in gradual inclinations to that maximum, free from sudden chasms or subaqueous promontories; and upon a plateau at the bottom of the sea there is formed an agglomeration by the constant current of the Gulf Stream, which proves, under microscopic observation, to be composed of the minute shells of Foraminiferæ and Diatomaceæ, and which, it is believed, will, in time, form a complete incrustation over the outer metal of the telegraphic cable.

It is singular that in no other part of the Atlantic than across this broad belt do conditions exist which, according to our present knowledge, would justify an attempt involving so much scientific interest, and so large a cost, as that of such a submergence of telegraphic wires.

To the southward of the Great Bank of Newfoundland, the bottom of the ocean suddenly recedes into vast and uncertain depths, due to some great former depression of the earth's crust, in many places unfathomed, which leave a channel for the Gulf Stream, along the whole of its course to the northward of the Gulf of Mexico. These depths continue, with intervals of abrupt and almost precipitous

breaks of elevation and depression, for half the distance eastward from the seaboard of the United States towards the coast of Portugal, and for as great a length in a north-easterly direction towards the coasts of England and Ireland. They are succeeded, in a direction due east, by the region of the Azores, where submarine volcanic action is constant, and where, owing to the deep soundings inshore and the absence of suitable bays or coasts in those islands, the secure landing and subsequent maintenance of the telegraphic cable would be very difficult and problematical.

With regard to the distance, it may be mentioned that a line from the nearest point on the coast of the United States, if taken direct, without touching at the Azores, would consume nearly 4000 miles of cable, and absorb considerably more than half a million of capital, and that, when laid, it would, in all probability, be soon abraded and destroyed, owing to the many and deep valleys it would necessarily have to bridge over along its course; while its great length would increase the difficulties and delay experienced in transmitting a current of electricity through very long circuits. Moreover, if carried by way of the Azores, using one of the islands as a relay station, the physical inequalities of the bed of the ocean would in no way be lessened in the western part of that route, and it would have the disadvantage of passing over a broader submarine volcanic region.

North of the coast of Newfoundland and Labrador, great difficulties also obviously present themselves. Vast masses of floating ice would, at all times, render the operation of laying a cable a most difficult, if not an impossible, undertaking, and even if landed, it would be liable to perpetual abrasion. The long and dreary tract of inhospitable country that would have to be traversed by land-wires, to complete its connexion with the civilised portions of the American continent, would alone be sufficient to prevent its adoption.

These then are the considerations which led to the adoption of the route for laying the telegraphic wires across the Atlantic.

We now come to the means by which the electric current is to be transmitted. It is quite obvious that the great bulk and enormous weight of all previously manufactured submarine cables would preclude their use for a distance so great as that to which, it is hoped, the Atlantic Company are about to extend a successful operation. A form of cable had therefore to be devised, which should combine a maximum of strength with a minimum of weight, great flexibility with sufficient rigidity to allow of its being laid in a straight line,

a capacity of tension if needful to a moderate extent without injury, with cohesion sufficient to ensure resistance to a strain of considerable amount.

In the form of cable adopted by the Company,* it is believed that all these conditions are fulfilled. The conducting medium is formed by a strand of seven copper wires; six of these wires are wound spirally round the seventh, which latter is laid straight through the centre, and the diameter of the entire strand is somewhat less than the eighth of an inch. Around this strand are placed three separate layers of gutta percha, and thus the "core" is formed, which is about three eighths of an inch in diameter. Upon the core the appliances for sinking it and providing against the strain and abrasion incident to the paying it out into the Atlantic are laid. These consist of a soft bed of hempen twist saturated with tar, which is wound round the gutta percha core, and on the exterior of this is spun, in spiral continuity, eighteen strands of iron wire. This operation completes the cable, the total diameter of which is five-eighths of an inch, and the total length 2500 miles, or about a third of the earth's diameter. The total continuous length of the copper and iron wire employed in its manufacture will be 332,500 miles, and if extended in one line would therefore go fourteen times round our little planet.

The form of apparatus with which it is proposed to project the electric current through a conductor of such enormous length, has also been specially adapted for the purpose.

The connexion of Great Britain with America by the means thus delineated will, it is trusted, be realized by the end of August in the present year. The magnificent United States' frigate Niagara, commanded by Captain Hudson, will ship her portion of the cable, consisting of 1500 tons, at Liverpool, and H. M. ship Agamemnon, under Master-Commander T. A. Noddall, will receive an equal amount off East Greenwich. They will then proceed to mid-ocean, when they will commence paying out the cable, the Niagara steaming towards the coast of America, and the Agamemnon returning to England. The Agamemnon has been preceded by the paddle-wheel steam-frigate Cyclops, for the purpose of taking soundings; and steps have been taken by the Admiralty to secure for naturalists all the materials whether animal or vegetable which may be brought up from the sea bottom. Let us

* I am indebted to Mr. T. Holdsworth Brooking, F.R.G.S., for these details. Mr. Bright is the able engineer of the Atlantic Telegraph Company.

then wish every success to this gigantic project, by which, combining the discoveries of Wheatstone with the ingenious contrivances of Morse and Whitehouse, the Anglo-Saxon race is determined to show, that not the broad or deep ocean can really separate the two great families of the same race and lineage.

Free-Revolver Stand.—A most ingenious invention, and one which must prove of great use to seamen, having been made by Mr. Piazzi Smyth, was recently tested by that skilful astronomer in his outward voyage to examine the natural phenomena on the Peak of Teneriffe, which has just been alluded to. This trial demonstrated the entire efficacy of his newly mounted "Revolver stand for steadying a telescope at sea."

Notwithstanding the excessive rolling and pitching of the vessel, he kept the sea horizon in one unvarying position in the field of the telescope long enough for several persons to observe it in succession. The only addition required was a remedy for the third element of motion, arising from the azimuthal *yawing* of the ship's head, and this his mind immediately suggested to him for consideration during a subsequent voyage.

New Geometrical Projection of two-thirds of a Sphere.—Our associate Colonel James, the Superintendent of the Map Office, has presented to us a copy of his new geometrical projection of a sphere, and in an accompanying letter has explained the manner in which the projection is made.

Its peculiar feature consists in the fact, that by it we are enabled to represent two-thirds of the surface of the globe in a strictly geometrical projection, much in the same manner that a hemisphere is represented in the stereographic projections; but as two-thirds of the surface of the globe includes the entire continents of Europe, Asia, Africa, and America, and indeed all the habitable regions of the globe, with the exception of part of Australia and some of the islands in the Pacific, this projection gives a more accurate representation of the relative position of every portion of the habitable globe (with the above exceptions) than any other, and as the circles of the parallels of latitude, down to the parallel of 47°, are complete, the circumpolar regions are very accurately represented. Availing himself of this latter advantage in his new projection, Colonel James is now having maps of the stars made on it, in which the circumpolar stars will appear in their true relative positions to each other and to the other stars, which will be included in the same map.

This projection of our Earth will be found of great use in many

scientific inquiries, and particularly when employed for geological lectures, in which it is required to bring as large a portion as possible of the land of the globe under the eye at once, and in which such distorted projections as those of Mercator or Babinet cannot be satisfactorily used.

Metallic Boats.—Our associate Major Vincent Eyre having suggested the use of metallic boats for Arctic as well as other expeditions, our Vice-President Sir George Back has strongly recommended the adoption of them for every purpose of inland navigation and among ice. Their great superiority to boats of wood was, he reminded us, clearly indicated when Lieutenant Lynch in 1848 passed down the river Jordan, running through thirty or forty desperate looking rapids and cascades, and, though frequently striking against sunken rocks, they received no injury beyond a few indentations; whilst a wooden boat of the expedition was broken up and lost.

Bells on the Goodwin Sands.—Mr. George Chowen has suggested a plan of attaching bells to the buoys placed over sand-banks or rocky reefs, so that in heavy mists and storms when the mariner cannot discern the buoy, he may be warned off by the ringing of a bell, which will sound as long as the buoy is agitated by the waves. Leaving this matter for the consideration of our nautical members, the suggestion seems to me to deserve serious consideration; seeing that such bell-buoys might be advantageously used, not only on sandy shoals like the Goodwin Sands, but might, if found to work well, be placed on lines at a certain distance from dangerous rocky headlands on which so many wrecks occur, such as the Deadman and the Land's End in Cornwall.

France.—Among the many proofs of the prevalence of the good feeling now happily subsisting between our nearest foreign neighbours and ourselves, the proceedings of the Geographical Society of France offer striking examples. Thus we have seen the accomplished geographer M. de la Roquette zealously devoting his best energies to the publication of a sketch of the life of Franklin, and then coming forward generously with a large subscription to aid in the final search after the ships and crews of our illustrious countryman. Next we find the same liberal spirit evinced in the award of their annual Gold Medal to our own Livingstone.

When we turn from the general efforts of the Geographical Society of France to the works executed by the Imperial Government, we recognize a steady progress in the surveying and mapping

of all tracts, coasts, and bays to which the influence of France extends.

Through the obliging communication of Rear-Admiral Mathieu, the Director of the Charts and Plans of the Imperial Navy, a catalogue has been transmitted to us of all the works of that nature which have been published, or are in the course of execution, during the years 1856-57. Referring you to this list which will be published in the Appendix to our Volume, I may now simply state, that it comprises four charts of the rivers Gironde, Loire, and Seine, in France; seven of the coasts of Italy, from Genoa to the Tiber; three of the Black Sea and environs, one of which is a detailed plan of the Bosphorus, in three sheets; and no less than fifteen charts and plans relating to various parts of the Mediterranean, both on the African and Spanish shores, even up to Ceuta, Algesiras, and the Straits of Gibraltar. In the sequel, and in speaking of the absence of good maps of Southern Italy, it will appear that in her occupation of the Papal States, France has effectually supplied that desideratum.

If we turn to the far west, we perceive that our active allies have been vigorously surveying the coasts of that central region of America which now justly occupies public attention, and that Haiti, Bahia, and New Grenada have also come in for their share of exploration; whilst of Newfoundland, not less than ten plans of bays, havens, and islands have been completed. From Iceland on the north to China and New Caledonia on the south-east, we have numerous examples of that zeal and precision of geographical survey which has characterized the French geographers from the days of d'Anville and Cassini.

To five new plans of the ports and bays of New Caledonia, a chart of the Archipelago of Pomatou, and six charts and plans of portions of the coast of China, are to be added numerous works included under the head of "Nautical Instructions," which are of great value to all seamen. In the present list we meet with Illustrations of the Sea of Azov, Nautical Description of the North Coast of Morocco, Instructions for entering the Port of Alexandria, Manual of the Navigation of La Plata, Description of Passages between Luçon and the Main Islands of Japan, together with General Considerations on the Pacific, &c.

Spain.—This ancient kingdom, so renowned in history, has hitherto remained without a Trigonometrical Survey, though its surface is, perhaps, more diversified and offers more attractions to the phy-

sical geographer than any area of similar extent in Europe. The Spanish Government is now, however, removing this opprobrium, through the agency of a commission composed of officers of the Engineers, Artillery, Staff, and Navy.

In 1854 the preparatory works were commenced for laying down the Trigonometrical Survey of Spain. The principal base line was measured on the plain near Madridejos, in the province of Toledo, and on the road to Andalusia, about 100 kilometres from Madrid. Its length is 14,480 metres. The first reconnaissances for several systems of triangles were made in the same year 1854, and in 1855 and 1856. One of these follows the direction of the meridian of Madrid, near which the primary base line is situated, and ends northwards in the neighbourhood of Motril, resting on the great mountain range the Sierra Nevada, and comprising in its network the towns of Ciudad-Real, Jaen, and Granada. Towards the north it is prolonged to Santander, including Segovia and Burgos. This chain is extended eastward, following the coast till it joins that of the triangles of the French Etat-Major on the Pyrenees, at the stations of Biarritz and Baigorry. This portion comprises the capitals of Bilboa and San Sebastian.

Another series is extended in the direction of the parallel of Madrid, and runs eastwards to the Mediterranean, resting on several points of the French triangulation made by Mechain and Delambre, and subsequently by Biot and Arago, for the prolongation of the meridian of Dunkirk, and taking in the chief towns of Teruel and Castellon de la Plana. Towards the west, this series passes by Avila, and for the most part following the direction of the Sierra de los Gredos, terminating in the interior of Portugal, on stations of the triangulation already made in that kingdom.

Another secondary series, leaving the last mentioned, has a northward course, terminating in the Cape Di Peñas, taking in Salamanca, Zamora, Leon, and Oviedo, all capitals of provinces. This chain is intersected perpendicularly by another which commences from that of the meridian of Madrid, to the south of Burgos, and runs westward, taking in Palencia, and following nearly the northern boundary of Portugal, until it reaches the sea near Vigo.

Another secondary chain of triangles has been similarly projected, which rests on that of the parallel of Madrid eastward, and stretches northward to Pampeluna, to connect itself with the French triangulation of the Pyrenees, passing by the Moncayo and between Saragossa and Soria. This chain has a branch which runs westward between the towns of Soria and Logroño.

In the early part of this year (1857) the instruments arrived for the definitive measurement of the fundamental base line, which will probably be effected immediately. Of late years, the Corps of Engineers has continued the survey of the fortifications and their environs with great minuteness and precision, whilst the Etat-Major has executed military reconnaissances of the principal lines of communication and of the battle-fields of Spain. The works carried out by the engineers of "Ponts et Chaussées" and other persons concerned in projecting roads, and especially railroads, have produced some interesting geographical details, especially with reference to the inequalities of the surface.

The commission formed for making the geological map of the Province of Madrid has zealously continued its labours in it and in the surrounding districts. Some of its Members, moreover, have made some interesting reconnaissances and surveys in the mountains of the provinces of Palencia, Santander, and Leon, which will be continued throughout the length of that great mountain range.

In the course of 1856 our correspondent Colonel Coello published maps of Almeria, Orense, and Ponteviedra, and the supplements of Leon, Caçeres, and Badajoz. The engraving of the maps of other provinces, by the same accomplished geographer, is far advanced, and in 1857 the remaining reconnaissances may, it is hoped, be finished.

Some memoirs and articles bearing upon the geography of Spain have also been published, both in separate papers and in the scientific journals, the 'Revista Minera,' the 'Memorial de Ingenieros,' &c.

M. A. de Linera has completed a small work upon the Sierra Nevada. M. Rojas Clemente had, half a century ago, fixed the height of the peak of Mulahacen at 3555 metres, an altitude which has been adopted by the Bureau des Longitudes of Paris. From new measurements it appears that this peak is only 3399 metres high; and hence the peak of Nethou, in the mountains of Venasque, in the Pyrenees, and near the French frontier (3405 metres), would seem to be the highest point in Spain.

Between the Pyrenees and the Sierra Nevada there are three other very considerable mountain groups. 1st. The Sierra de los Gredos, the highest peak of which, or Plaza de Almanzor, reaches to 2630 metres, according to the trigonometrical measurements of M. Subercase. 2nd. The Torre de Cerredo, one of the celebrated

'*Picos de Europa*' between the Asturias and Leon. According to the observations of M. Casiano de Prado the mountain is 2668 metres high, and is composed of Carboniferous Limestone. 3rd. La Sierra Sagra de Huescar, on the borders of Andalusia and the kingdom of Murcia. According to the observations of MM. de Verneuil and Collomb, * this lofty mountain (2400 metres) is composed of Jurassic Limestone.

That indefatigable explorer and sound geologist, M. Casiano de Prado, aware that he could not adequately express those geological discoveries which he is continually making in his native land, if unprovided with good geographical data, has himself surveyed the province of Palencia, of which, in the course of the year, a map will be published exhibiting all the geological as well as geographical features of that interesting tract. M. Casiano is also continuing his researches in a more southern region, and is preparing a map of the province of Leon.

M. Vezean, a young student of Montpellier, has, it appears, published a geological map of the environs of Barcelona, the data of which are spoken of favourably by M. de Verneuil, as having been laid down on a local survey, which contains many corrections of pre-existing maps.

I cannot conclude this notice of the progress of geography in the Peninsula, without reminding you of the great value of the researches of my dear friend and old companion in Russia, Sweden, and Germany, M. Edouard de Verneuil, one of the most distinguished members of the French Institute.† During several consecutive years this eminent geologist and palæontologist has so laboured, entirely at his own cost and unaided by any government, that he has not only thrown a new light upon the internal structure of large regions of Spain, but has, by careful barometrical measurements, determined the heights of many of the most lofty mountains, and of localities equally important to the geographer and naturalist as to the geologist, all of which were previously unknown.

Switzerland.—The very able notices on the progress of Swiss geography, which have been received by the Secretary from our

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* *See* Tableaux Orographiques par MM. de Verneuil, E. Collomb, et de Lorière, Bull. Soc. Géol. de France, 1854, and Comptes Rendus, tom. xl. 1855.

† The account of the progress of geography in Spain I owe to M. de Verneuil, who obtained the details of the Government Surveys from Colonel Coello, whose maps, above alluded to, are to be added to the great statistical work of M. Madoz.

distinguished correspondents Chaix and Ziegler, will be noticed in an early publication, and reviewed at the next Anniversary.

Italy.—The most important contributions to geography during the past year have been the continued publications of the great Government Surveys in Piedmont and Central Italy.* The Piedmontese survey, on a scale of $\frac{1}{50000}$, is nearly completed, and upwards of forty sheets have been already given to the public.

My predecessors in this Chair and myself have had occasion to allude to the Austrian Survey of Central Italy, perhaps the most important work of the kind connected with Italian topography. I am happy to announce that this great work is now completed—the last sheets embracing the mountainous region of the Marcii, Hernici, Volscii, and Sabines, on the Roman and Neapolitan frontier. The Carta Topografica dell' Italia Centrale, in fifty-two sheets, embraces the whole of the Tuscan and Roman States, on a scale of $\frac{1}{86000}$, and forms a suite to the elaborate surveys of the Lombardo-Venetian kingdom, and of the Duchies of Modena, Massa, Carrara, Parma, and Piacenza, published some years before by the same Government. A reduction of the Italia Centrale, in four sheets, is now in progress at Vienna.

Rome.—The wish so long felt by every antiquary, geographer, and geologist, to possess a good map of the environs of Rome, has been at length satisfied by the publication of the elaborate survey, undertaken by the officers attached to the French Army of Occupation, and of the last sheets of the Austrian map of Central Italy. The French map, in four large sheets, has just been completed, and is in every respect worthy of the Dépôt de la Guerre, from which it has been issued. The scale is the same as that of the great Trigonometrical Map of France, $\frac{1}{80000}$; it embraces all the Roman territory between the parallels of 41° 30′ and 42° 20′, and as far east as the meridian of 12° 55′ east of Greenwich, consequently the most interesting parts of Southern Etruria, of the Sabine territory, and of Latium, in the vicinity of the capital of the Roman world. The topographical details are beautifully laid down; those of the volcanic group of the Alban range are in this respect remarkable. Two advantages of the French Survey over the Austrian consist in having the heights of the principal localities marked, and their ancient names annexed. The Roman Government is now preparing a map of the

* For these details respecting the geography of Italy, I am indebted to my gifted friend Mr. Pentland.

environs of Rome, nearly upon the same scale as the French Survey, upon which will be laid down the principal estates of the great landowners; and M. Rosa, a very laborious topographer, who has already surveyed in great detail many of the most interesting districts around the Eternal City, has just completed a very beautiful map of the Alban hills, on the eve of publication by the Roman Topographical Office (*La Direzzione del Censo*).

In the posthumous work of the late eminent Antiquary, Architect, and Topographer, Commander Canina, are contained several maps and plans of considerable interest in a geographical point of view, amongst which the revised edition of his great map, in six sheets, of the Campagna of Rome, of the Upper Valley of the Anio, with detailed plans of the most remarkable ancient towns and classical sites of the Alban Lakes, and the ancient ports of Centumcellæ, Portus Trajani, Ostia, Antium, &c. &c. Connected with our pursuits may be mentioned the detailed statistics of the Roman States (*Statistica della Popolazione dello Stato Pontifico*), just published by the Papal Government.

Naples.—I am not aware that any progress has been made by the Government of this country in the great Survey of the kingdom, inaugurated by our late Associate, General Visconti.

The French Dépôt de la Marine, having obtained the consent of the King of Naples to prolong its hydrographic survey of the West Coasts of Italy, beyond the Neapolitan frontier, M. Darondeau has been able, during the past year, to complete it as far south, and including the Bay of Naples, the Ponza Islands, &c. This, with the survey of the Roman Coast, is terminated, as my friend Mr. Pentland tells me, and will form a worthy complement to the great survey of the coasts of Italy, commenced in 1841, and which extends from the mouth of the Var to the Island of Capri. M. Darondeau is now engaged in rectifying the charts of the Lipari Islands, in the position of some of which errors of importance have recently been pointed out.

Island of Sardinia.—General A. della Marmora has completed his labours on the Physical Geography and Geology of this interesting island, by publishing the last volume of his great work, containing geology and descriptions of the fossils, by the eminent palæontologist, Professor Meneghini, of Pisa. As General Alberto della Marmora (brother of the Sardinian commander-in-chief in the Crimea) has devoted the best years of his life to the accomplishment of this ar-

duous task, I have sincere pleasure in recording my hearty approval of a work, in which he has united the powers of a skilful physical geographer with those of an indefatigable geologist.

Germany.

The progress of geographical science is now so well promulgated through Germany by the 'Mittheilungen' of Dr. Phil. Petermann, that it is unnecessary I should do more than call attention to the value of this methodical and well-illustrated monthly Periodical. In it are to be found accounts not only of what is written or recorded in the Geographical Societies of Berlin, Vienna, and other cities, under the guidance of a Humboldt, a Ritter, and a Haidinger, but also reports of descriptions of newly-explored countries in various distant regions, accompanied by well-executed maps.

Aware that a certain amount of discontent has sometimes been expressed, at the appearance for the first time in this German work of the voyages and travels of individuals who have been, or are in the pay and service of Britain, I would beg my associates to consider, how natural is the feeling of any foreign traveller engaged in the British service, to wish to see the outline of his researches first made known in his native land, and how his countrymen on their part should feel a just pride whether in perusing or in publishing the writings sent home to them in their vernacular freshness from remote corners of the earth, with which they are necessarily less familiar than the people of a maritime country like our own.

Whilst then there have occurred examples of the publication of the outline of travels of English agents for the first time in German, which might have been previously noted in the Proceedings of our Society, as coming from the Secretaries of State who are our Associates, and who usually send to us their earliest communications respecting foreign travels, I would earnestly deprecate anything approaching to a feeling of uneasiness upon this subject.

Contented with the reflection, that knowledge cannot be too widely diffused, let us hope that our German friends, clearly recognizing and honouring the British channels through which their information is obtained, will always work harmoniously and in unison with us. Banishing therefore all jealousy, and admiring the perseverance and skill of such contemporaries, I am bound in fairness to say, that the 'Mittheilungen' is exercising a powerful and salutary influence on the progress of our science; and as the spi-

rited proprietor of this Periodical, M. Justus Perthes of Gotha, has spared no expense in bringing out the work in an attractive form, so I rejoice to hear that its sale is becoming very large—upwards, as I am told, of 3000 copies being in monthly circulation.

The advancement of our science in Prussia has, I am sorry to say, received a serious check in the recent decease of Dr. Gumprecht, the Editor of the 'Monats-Berichte' of the Geographical Society of Berlin, who, after successfully prosecuting some branches of geology, had devoted himself with great energy to the extension of our acquaintance with the geography of Southern Africa. But what is most deeply to be regretted is, that he was suddenly carried off when engaged in a great and important work on the geography of Germany, a subject, on which I hope, through the assistance of my friend M. Ritter, to be better enabled to speak at our next Anniversary.

In this brief and very imperfect notice of the progress of geography in Northern and Central Germany, I have great pleasure in specially acknowledging the accession to our collection of many valuable maps published by the Bavarian Government, which have been communicated to us through His Excellency Baron de Cetto.

Of the distinguished travellers Schlagintweit it is my province to speak in a notice of Asiatic discoveries.

Austria.—Endowed with various noble establishments for the advancement of science, possessing many good geographers, and publishing most admirable maps of the different parts of her empire, Austria was without a Geographical Society until the 21st of September of last year. It was then that my valued friend William Haidinger, long known as an eminent mineralogist and geologist, and much esteemed by his contemporaries in every land as well as in his own, uniting with a few zealous friends, and obtaining the consent and protection of the Government, established the Imperial Geographical Society of Vienna. To a great extent this body, like that of St. Petersburg, is founded on the model of our own Society, though the regulations and interior management necessarily vary with the different form of the Government of the country.

In speaking of the Proceedings of this Society, I cannot avoid specially alluding to one point of the proceedings of our Austrian friends; namely, the recent departure of the Imperial frigate the Novara on a voyage of scientific exploration round the world. When this expedition was decided upon, and a number

of able men were chosen, to form its scientific staff, the President of the Imperial Geographical Society having applied to me, and explained its object, I had real gratification in writing letters of introduction to all the authorities, with whom I was acquainted, at the places which this frigate might visit. Admirably organised, the expedition has enjoyed the great advantage of having had its officers furnished (as M. Haidinger informs me) with the minutest instructions of the venerable Humboldt, whether upon the magnetic equator, the magnetic curves in the different oceans, the lines of no deviation and equal intensity, or on cold and warm currents, particularly those along the Peruvian coast, and on the tropical East and West counter-currents. The great traveller has also enjoined the cutting of marks on the rocks, to register the actual mean level of the sea, the same practice which he had formerly recommended for adoption on the shores of the Caspian; and he has especially urged the collection of specimens from the active volcanos of South America, which he has enumerated *seriatim*, with a view to a correct classification of such igneous products, which he believes will be found to exhibit an arrangement in separate linear masses.

If I may judge of Dr. Scherzer and the other gentlemen who accompany him by the encouraging example of his associate Dr. Hochstetter, the geologist, who visited this country to obtain from General Sabine information and instruction in making magnetical observations, I can have no hesitation in saying that this first effort of Austria to circumnavigate the globe will produce a harvest worthy of that ancient empire, and will reflect the highest credit on the new-born Geographical Society of Vienna.

Russia.—With the return of peace, which has happily taken place since our last Anniversary, it is most gratifying to one who has been so long connected with the science of Russia as myself, and who has been so heartily welcomed in that Empire by all persons, from the Emperor to the peasant, to be enabled to recur to the geographical labours of those old allies of our country, to whom I am naturally much attached.

Whilst the late war impeded all scientific communication with the countries of the West, Russia was steadily advancing researches of the highest importance to physical geography in her distant and slightly known territories, and particularly on the north and east. The great expedition to the northern part of the Ural Mountains, under the conduct of Colonel Hoffmann, had indeed obtained, before the war, the active support of the Imperial Geo-

graphical Society, and of its President the Grand Duke Constantine.

The second volume of the work descriptive of this long and laborious enterprise has recently been published; the first part, by Krusenstern, having already been made known to geographers. This second volume specially relates to the 'Pae-Khoe,' or Rocky Mountains, and has completely satisfied the expectation of naturalists, physicists, and geologists. The historical and geological portion by Hoffmann; the classification and description of the fossil organic remains by Count A. von Keyserling, my distinguished coadjutor in earlier days; and the descriptions of the minerals by Gustaf Rose; of the animals by my colleague of the Imperial Academy, Brandt, and of the flora by Ruprecht, together with meteorological, physical, and hypsometrical observations, are all of a high order of merit. The exploring parties examined the principal chain of the Ural, north of Petropaulovsk, from the sources of the river Petchora up to the highest northern peak (68½° N. lat. and 66⅓° E. long.), which, hitherto nameless, had been termed by this expedition Konstantinov Kamen, in honour of their geographical president, his Imperial Highness the Grand Duke Constantine. Westward from this point runs another mountainous ridge, the Pae-Khoe, continuing in a W.N.W. direction, and running parallel to the northern coast as far as Vaigats Strait. The highest point of it is the Puedaia, and the geological structure proves that the Pae-Khoe is not, as hitherto supposed, a continuation of the Ural.

The average height of the northern Ural is about 3000 (the Töll Poss and Sablja are above 5000) feet. Patches only of snow are visible on some mountains, but no lasting covering of it is seen at 68° N. lat.; although, as Leopold von Buch remarks, snow is found in Norway at 67°, and at a height of 3800 feet only. The volumes in which these important explorations are described, are characterized by a minuteness of detail, on all branches of science within the scope of the undertaking, which entitles the work to rank as one of the most valuable scientific publications that Russia has ever produced. The accompanying map is of great use to practical geographers, and a marked addition to the pre-existing geography of Europe.

The efforts of the Imperial Geographical Society to diffuse an adequate acquaintance with our science throughout the interior of Russia have been most commendable. Thus, this body not only publishes volumes and bulletins like our own, but also translates

into Russian, useful standard works, including those of the celebrated Carl Ritter, and brings out catalogues of the geographical maps of Russia, as well as reviews of geographical, statistical, and ethnographical labours. Even the commerce of the interior comes within the scope of our vigilant rivals, whose Society was founded on the model of our own.

The most extensive scientific exploration which the Society has ever undertaken, is one which is still in progress, or that of Eastern Siberia. Its object is to examine and determine, by astronomical and trigonometrical observations, the geographical features of the vast region between the Lena and the Vitima, and also of the south-eastern tracts beyond the Lake Baikal. The chief astronomer, M. Schwartz, has under his direction MM. Oussoltzoff and Sminiaguine, and is accompanied by the artist and academician Meyer, and by M. Radde the naturalist.

The results of the first year's labours are given in the 'Compte Rendu' of 1855, edited by M. Lamansky, and there can be no doubt that geographers will soon possess not only a correct delineation of these remote regions, but also striking and characteristic sketches of the scenery of all the border frontier regions of Siberia —a map of the river Amur having been already published. Among the great feats of our contemporaries, I learn that MM. Semenoff and Wasiljin have made known the existence of an extinct volcano near Mergen, in Manchuria, which was in activity in the year 1721; and that the mountain of Demavend has been ascended by M. Khanikoff.

In writing to me of these explorations, and of a remarkable expedition to the Lake Issingul, my illustrious friend Humboldt thus expresses himself:—"On the northern side of the great volcanic chain of Thian-Chan, they have, it is true, discovered plutonic rocks only, such as granite and gneiss, and along the edges of the great bitter lake of Central Asia (Issingul) no trachytes (volcanic rocks) have been seen; but it must not be forgotten, that from the eastern shore of that lake to the Volcano Peschan (the most western of the volcanos of the Thian-Chan, or Celestial Mountains) the distance, in a straight line, is not less than 250 English miles."

In reference to Eastern Siberia and those vast tracts of Central Asia which lie between the defined boundaries of the Russian and Chinese Empires, let me say that the English public will soon have presented to them a work containing the most vivid and remarkable

pictorial representations from the pencil of their countryman, Mr. J. W. Atkinson.

Under the patronage of the Emperor Nicholas, Mr. Atkinson devoted seven years of his life to the exploration and delineation of a region, of the greater part of which no European had hitherto obtained the slightest knowledge. Let my associates inspect the large original water-colour landscapes by this artist, representing the marvellously tinted and wild rocky countries of Mongolia, the great Steppes of the Khirgis and Chinese Tartary, including views of even the snowy Thian-Chan, of which reduced engravings will soon be published, and they will readily admit, that if such sterile, igneous, rocky masses, should not afford gold or silver, they can prove of little value to any civilized country.

Among the subjects treated by the Russian geographers during the year 1856, the mere enumeration of the following works, which constitute a very few only of the communications to the Imperial Society, will show the importance of its labours :—The Geography of Vegetables, in four vols., by M. Béketoff; the Fauna of the Mouth of the river Amur,* by Schrenck; a new Ethnographical Map of Europe, by Koeppen; the Geographical and Ethnographical Terminology of Central Asia, by Stchoukine; Report of Lieutenant Oussoltzoff of a Voyage to the Sources of the River Vitima; and an account of those Volcanos of Central Asia, by Semenoff and Wasiljin, to which allusion has just been made.

Asia Minor.—In February of this year, I had the pleasure of communicating to the Society a memoir, which I had received from General Jochmus, relative to a proposed communication in Asia Minor between the Lake of Sabanja, the River Sakaria, and the Gulf of Nicomedia. The utility of this project had been fully recognized in ancient times, and the question has been several times agitated, at widely different periods, up to the close of the last century. The distance from the River Sakaria to the Lake of Sabanja, between which there already exists a natural communication by the little river of Sari-deré, is not much more than three miles and a half; and from the Lake to the Gulf of Nicomedia it is scarcely nine miles, whilst no difficulty exists on the score of difference of level. There can be no doubt that such a system of canals, of sufficient width

* *See* p. 126 *ante*, for a notice of the hydrography of the river.

and depth to admit of the passage of coasting-vessels and small steam-boats, would open up valuable internal communication for the ready supply to Constantinople of wood, charcoal, and the most necessary articles of daily consumption.

Persia.—During the present session, whilst our country has been temporarily engaged in hostilities with Persia, it has been our good fortune to have present amongst us our distinguished medallist Sir Henry Rawlinson, who has enlivened our meetings by his agreeable and instructive lessons on the geography of countries with which he has made himself so intimately acquainted. By his extensive personal knowledge of the East, united with those varied attainments in classical and Oriental literature, which have made his name distinguished throughout the world, Sir Henry has been enabled not only to communicate to us information of the most important nature with respect to the modern geography of Southern Persia, but also to illustrate that information from the rarer resources of his own especial studies in ancient history. With respect, moreover, to the recent movements of our army in Persia, the strategical knowledge of Sir Henry has added a peculiar interest to his observations on the country where they have taken place. I cannot refrain from congratulating you, at the same time, on having had the advantage of two such able and experienced commentators on these interesting and important subjects as General Monteith and Mr. Layard.

In summing up the results of the information we have thus gained, I will here confine my remarks to that which is essentially geographical. The most striking points to which our attention has been drawn, in this respect, are the changes produced in the channels of the rivers and on the coasts immediately proximate to their embouchures. These important facts are worthy of especial notice, both in a prospective and a retrospective sense, since they will materially modify our calculations in the more doubtful reading of early history, and our judgment as to calculations with respect to the future condition of these coasts. The agents of these changes are clearly intelligible. There are but two winds which prevail in the Persian Gulf—the north-west and the south-east, and, when the latter sets in, the whole force of the Sea is brought to bear directly against the current of the Euphrates, and hence an enormous deposit of the alluvium brought down by the stream is effected, thus barring up its mouth. This deposit, constantly on the increase, progresses, by Sir Henry's calculation, at the rate of a mile

in the lapse of thirty-five to forty years. An example of the effect of this agency in by-gone times is adduced in the fact, that a great city, of which the ruins are to be seen above Mohammerah, was an island in the time of Sennacherib, named Billat, and can be shown to have been still an island in the time of Alexander. At the present time it is sixty miles from the embouchure of the river, and a succession of cities can be traced upon the desiccated delta below it, along the river, down to the sea.

A question of essential moment has also been explained by Rawlinson as to the frontier line between Turkey and Persia,—a point upon which our maps have been greatly wanting in correctness. The real line of frontier—as determined by the Commission of Delimitation, appointed under the provisions of the Treaty of Erzerúm—comes down to Mohammerah, and then follows the course of the Euphrates to the sea. It was agreed that the country watered by the Euphrates belonged to Turkey, and the country watered by the Karun to Persia; but the question was, whether Mohammerah was on the Euphrates or on the Karun. It was decided that the place should be considered to belong to Persia, but as according to Sir Henry's belief it is situated on the Euphrates, this decision would seem to be contrary to geographical accuracy.

Thibet.—Early in this year some extracts were read to the Society from the memoir of a journey across the Kuen-luen from Ladak to Khotan, communicated by Colonel Sykes from the brothers Schlagintweit, already so well known to geographers and naturalists by their labours on the physical geography and geology of the Alps.

These accomplished gentlemen, who travel by the desire of the King of Prussia, and at the suggestion of Baron Humboldt, have been employed, under the patronage of the East India Company, in the physical survey of the distant trans-Himalayan regions. The extracts communicated to us, form a small portion only of the information they have sent home, but from some brief allusions to the groups of hot springs near the Kiook-Kiul Lake and the Valley of the Nubra, we may feel assured that, when all their memoirs are published, they will be found replete with curious observations on many subjects; and specially on those mineral springs to which Humboldt long ago invited attention, as proofs that the Kuen-luen was of volcanic origin.

The brothers Schlagintweit have laid down the entire orography of Kemaun. M. Adolf Schlagintweit, after visiting the glaciers of

Pindari, was joined by his brother Robert; and they examined together the glacier of Milum, which surpasses in extent all those of Switzerland. It is from 8 to 10 miles in length, and 3000 feet broad. The mountains which surround this glacier consist of crystalline schist, covered by fossiliferous strata of the Silurian age. The two brothers have also measured the height of Nanda Devi, an insulated peak surrounded by deep precipices, at the foot of which is the glacier of Pachou.

But rather than attempt, on my own part, any sketch of what these distinguished German travellers have accomplished, I will here quote to you, from the pen of Humboldt himself,* a short summary, which he has sent me, of their remarkable explorations.

"Hermann and Robert Schlagintweit," says the Baron, "have had the proud satisfaction of passing in August, 1856, the chain of the Kuen-luen mountains, and of reaching Eltschi in the province of Khotan. As I am vain enough to believe that my map of Central Asia (the result of five months' labour, in bringing together the detailed accounts of the Buddhist priests Fahian and Stenan-thiang, with those of Marco Polo, Wood the explorer of the Pamir, Burnes, Vigne, together with the excellent sources of information supplied by Klaproth and Stanislas Julien) represents more faithfully the formation of the ground than the other maps in your possession, the range of which beyond the Himalaya is mythologically doubtful, I invite you to examine it before you read or rather try to decipher these lines. A botanist of the highest merit, Dr. Thomas Thomson, who, conjointly with my excellent friend Joseph Hooker, published in 1855 the 'Flora Indica,' says in the Introduction Statistique, p. 215, 'The chain of the Kuen-luen, where it forms the northern boundary of Western Thibet (where Dr. Thomson resided a considerable time), is as lofty as the Himalaya.' *Its axis has not been crossed by any European traveller*, but has been reached by Dr. Thomson, who visited the Kara-korum pass, elevated 18,300 feet. This testimony will show you the importance of the success of the brothers Schlagintweit. On the morning of the day, on which they crossed by the Kara-korum pass, they met a caravan coming from Yarkand, and near the salt lake of Kiook-Kiul they found the hot springs of Panamik and Tchanglung, with a Centigrade temperature of 74° 2′ and 78°, and on an immense plateau at altitudes of from

* For the letters of the brothers Schlagintweit, communicated by Baron von Humboldt, see also the Berlin 'Zeitschrift der Allgemeiner Erdkunde' for 1856, pp. 532, 551.

16,800 to 18,000 feet, they had to endure a degree of cold at their nightly bivouac of 11° 4' Cent. below freezing point. Fahian, at the close of the 4th century, writing of Bushia south of Eltschi, the capital of the province of Khotan, praises its high cultivation; its elevation being not more than 9200 feet. 'We were at a day and a half's journey,' say the Schlagintweits, 'from the northern part of the high chain of Kuen-luen. After leaving Sumgal, we travelled for three days along the banks of the Karagash, which gave us an opportunity of inspecting the famous quarries of stone called Yaschem, which people come from a great distance to visit. Between Kara-korum and the Valley of the Nubra we measured several mountain peaks above 24,000 feet of absolute elevation. The dip of the magnetic needle between July and September is registered in figures.' The geological excursions of Adolf and Robert Schlagintweit in Eastern Thibet by Niti and Gertope, to the glacier of Ibi Gamin, have also been very important. The travellers reached it on the 19th of August, 1855, and trusting to the corresponding observations in Agra, fixed the height they attained on Ibi Gamin at 22,260 feet = 20,886 French feet. This is not only higher than I reached at Chimborazo (18,096 French feet) in 1802, and which Boussingault made (18,480 feet) in 1831, but it is also higher than the summit of Chimborazo itself, which I found by trigonometrical observation to be 20,100 French feet in height. As the Schlagintweits were the first who reached the top of Monte Rosa, they are accustomed to this kind of expedition. A portion of their magnetic observations of the Himalaya has been printed separately at Calcutta, and my respected friend General Sabine will doubtless give them due credit for their assiduity. They have also made some interesting and delicate observations on the influence of great heights on the variation of the magnetic needle. They will bring back to England some beautiful geological collections, perhaps even in the course of this autumn; for you are aware that by the munificence of the East India Company and the generous kindness of Colonel Sykes, who is a noble advocate of every thing which appertains to the sciences, the brothers Schlagintweit have received every encouragement."

When I reflect that these brothers have penetrated farther into Thibet and Tartary from the plains of India on the south, than any other European; that their physical, geological, and geographical observations are said by Humboldt to be of the highest value, and that they have even made photographic sketches at heights of

20,000 feet above the sea, I cannot but rejoice, that these élèves of the great traveller of the age, should have performed journeys, which have elicited from that illustrious man, now in his eighty-seventh year, the expression which I have read to you, reminding us of the best days of the explorer of the Andes and Siberia.

Borneo, Burmah, and China.

Borneo.—Our Associate Mr. A. R. Wallace has supplied us with some important corrections of the north-west portion of the map of Borneo, derived from his observations in a journey up the Sadong River. From his account we gain valuable additions to our information respecting the physical geography of that vast island, together with some very interesting comparisons, bearing on the ethnological similarity between some tribes of the Dyaks and the Indigenes of the valley of the Amazon. Amid the uncertainty which hangs over the history of the migrations of various branches of the human family in remoter periods, these notices of distinct resemblance are of especial moment; and in the present instance the observations of Mr. Wallace are confirmatory of the views of Dr. Latham and others, who regard the Americans as Mongols who have emigrated direct from Eastern Asia.

A further exploration of this important island has been set on foot during the past year by Lieut. C. A. C. de Crespigny, R.N. Great importance must be attached to the investigation of the resources of this vast country, which is already known to be largely productive of some of the choicest desiderata for the advancement of civilisation. As a mineral country it is, according to Mr. John Crawfurd, perhaps the richest in the East. Gold, coal, antimony, iron, caoutchouc, and gutta-percha, have already been derived from it in abundance; and who shall say what further discoveries may lie open to the search of a skilful explorer? The geographical position of the island moreover, lying, as it does, in the direct route between China and Australia, presents an additional stimulus to the development of its unknown resources.

It is satisfactory to know that our Medallist, Rajah Brooke, has been anxiously occupied in developing various branches of industry within the range of his jurisdiction at Saráwak, among the most important of which must be classed the opening of coal-mines; and it is indeed a matter of sincere congratulation that he should recently have escaped from the imminent danger in which he was placed by the late insurrection of the Chinese settlers.

Burmah.—We are indebted to Captain Yule, of the Bengal Engineers, who had been sent by the Indian Government to Amarupura as secretary to Major Arthur Phayre, for a most valuable communication on the geography of Burmah, with an illustrative map of that country. Captain Yule has compared and brought together with great ability the various valuable surveys of several of his precursors in different parts of this extensive field of operations. His principal materials were a Survey of the new British Province of Pegu, by Lieut. Williams of the Bengal Engineers, still in progress; a New Survey of the Province of Martaban, by Mr. Hobday; a Survey of the Irawady to Ava, by Captain Rennie and Lieut. Heathcote of the Indian navy. Besides these data, Captain Yule contributes his own sketch of part of the Aracan Yoma range and its passes, and a rearrangement of the Chinese frontier and the Laos States east of Burmah, as taken from the Route Surveys of Dr. Richardson and Captain McLeod. A considerable error in the longitude of the Irawady at Prome, and the higher parts of the stream, as assigned in previous maps, is pointed out. This error, which, in 1853, Captain Yule had indicated as probable, in a Memoir on the Passes of the Yoma, has been confirmed by the surveys since made. The geological portion of the work by Mr. Oldham, the Superintendent of the Geological Survey of India, affords much important information respecting the structure of the country, the rocks, and their relations; and renders the publication additionally valuable by the observations it contains on the statistics of the productions of the country, including certain mineral substances described by that good geologist. This work, which was printed for limited circulation at Calcutta, by order of the Governor-General, is now in the course of publication by the East India Company, accompanied by a map, engraved by Mr. Arrowsmith; and Mr. John Crawfurd, who, from his acquaintance with the Burmese empire, is most competent to express an opinion, has spoken of it with marked approbation.

China.—Believing that our members would gladly receive information relating to China from so competent an authority, I induced our distinguished member Sir John Davis to read at one of our meetings a Paper of great value, and which many of you heard with pleasure.* Certainly no living Englishman, and indeed no living European, was so competent to such a task. He is among

* *See* Proceedings, No. IX.

the few of our countrymen who have acquired the difficult language of China, and he long filled the highest offices which an Englishman can discharge in relation to that singular country. The fruits of his literary labours have been several works, which have the rare merit of being at once popular and scientific. As one of the most important of these, his 'China and the Chinese,' is by far the best account of the empire in any language, I am glad to find that a third edition of it has just been published.

Africa.

The additions to our acquaintance with the interior of Africa since the last anniversary, when my predecessor delivered the Patron's Gold Medal to Dr. Phil. Barth, have been considerable. That meritorious explorer of vast regions has since issued to the public three volumes, which, recording his earlier wanderings, are to be followed by two others, completing a work which will doubtless be considered the worthy termination of so many years of patient research under great privations. The maps which accompany the narrative have been executed by Mr. Petermann, from the careful itineraries of Barth, the astronomical determinations by Vogel of the positions of Murzuk, Kuka, and Zinder having formed the base. Dr. Overweg's determinations of latitude have been made use of as regards the route from Tripoli to Tintellust and the route to Musgu; and I learn from Dr. Barth that all these points will be discussed at the close of the work. I reserve, therefore, my full observations on the whole of the labours of the only British traveller who ever returned from Timbuctoo, until we have before us the concluding description of his arduous journeys. In the mean time, however, it may be truly said, that the volumes already published contain much valuable information, and show that Dr. Barth was so completely at home among the natives, with seven of whose languages he was familiar, and made such very diligent inquiries, that the information thus gathered, is far more ample and minute than that of his precursors; the itineraries, which have been compiled from hearsay evidence, being entitled to especial weight. It is particularly worthy of notice that the tracts which this traveller explored to the south of Lake Chad were found to be level, and abounding with lagoons, swamps, and long flooded tracts, analogous to those which Livingstone found to the south of the Equator, whilst the watershed between the affluents of Lake Chad and the river Benué

would seem to be little more marked, than that between the Zambesi and Lake Ngami of S. Africa. So much is this the case, that Barth suggests how boats may reach the lake in ascending from the sea.*

Independently of the impediments which the climate and its diseases offer to the research of Europeans, the other great obstacles presented to the enterprise of Barth and his companions have not, I apprehend, been sufficiently appreciated. All along the broad zone stretching across Central Africa, between 11° and 5° of N. lat., there prevails more or less a continuous and merciless warfare between the Mahomedans and the Pagans, which presents the most appalling checks to the traveller proceeding from the territory of any Mahomedan prince to whom he may be accredited. For whilst Livingstone has demonstrated the practicability of traversing vast tracts of Southern Africa, occupied by people speaking various dialects of the same language (none of them being Mahomedans), such facility of intercourse is forbidden through the region north of the equator. There, a solitary traveller, scantily supplied with means, has to cross this belt by proceeding through hostile tribes engaged in sanguinary warfare, and is at the mercy of every petty tribe and barbarous chief whose district he has to traverse.

Whilst in regard to Overweg, who, it appears, kept very few notes, we have to regret that nearly all the important information he had accumulated perished with him, I am bound to record that Dr. Barth deserves all praise for making and preserving detailed records, when struggling against depressing illnesses and great misery.

From what we know of the efforts made by himself and his associate, it is, indeed, too manifest that the progress of discovery in Africa, south of Lake Chad, can be only very slow and gradual.

Such, then, are the difficulties from which Barth has escaped, and of which he is now rendering us a vivid and detailed account—such is the country in which Dr. Vogel and his faithful attendant, Corporal Maguire, were left. My predecessor has recorded in his last and only Address, what progress Vogel had made after leaving Barth in 1854. Foiled in his attempt to reach Adamawa, the route between Hamarrawa and Yola being occupied by warlike bodies, Vogel had already determined by astronomical observations the real site of the important town of Yakoba, situated on a rocky plateau 2500 feet above the sea. Returning from Hamarrawa to Gombé, through

* Vol. iii. pp. 202, 221.

mountains inhabited by Pagan tribes, he left Corporal Maguire there, and turned westward himself to determine the waterparting between the so-called Yeou, the river which joins the lake Chad from the west, and the smaller and eastern branches of the Niger or Kwora. It was then that he discovered in a very hilly tract a northern or important branch of the Chadda, named Gongola, and proceeded as far as Zuriga, the capital of Zeg-Zeg, the erroneous position of which in previous maps he corrected. Proceeding to Bebeji, the site of which he also fixed, he arrived at Kano, a place then afflicted by cholera, and, returning to Yakoba, again descended into the valley of the Chadda at Zhibu of Dr. Baikie (Chunbum of Vogel). Visiting several places on the river, he observed a large cetaceous animal called Ayu, to which his attention had been directed by Barth, and since named by Professor Owen *Manatus Vogelii*.* Having rejoined Maguire, who had suffered much in the mean time from sickness, they returned in December, 1854, to their head-quarters at Kuka. Procuring there fresh supplies he intended to proceed to the E. and S.E., and started for Waday on the 1st of January of last year, leaving Maguire in Kuka, since which time we have had no reliable tidings of his progress.

Dr. Barth suspects, however, that he must have made some stay at Loga or Logone, visited by both Denham and Barth, and perhaps in Bagirmi, where both the travellers also spent some time.

Whether the order ever reached Vogel to direct his steps towards the Nile is unknown, but at all events it is certain that he was proceeding in that direction, when, as it is reported, he fell a sacrifice to the orders of the savage King of Waday, such being the news brought by the natives to Corporal Maguire, and reported to the Foreign Office by Colonel Hermann, H. M.'s Consul at Tripoli. There is, indeed, too much reason to apprehend that this report may prove true, seeing that the King of Waday, a violent and revengeful man, may have taken the life of Vogel, because some of his sable majesty's property had unfortunately been seized and confiscated in the port of Bene-Ghazi to satisfy the claims of British merchants, and at the very time when an English agent was travelling in Waday.

On the other hand, knowing that both Dr. Barth himself and our other African Medallists, Galton and Livingstone, were reported to

* For translation of Vogel's Paper by Dr. Norton Shaw, *see* Report of the British Association, 1856, p. 98.

be dead, and are now happily among us, I still entertain some hope, that the able and accomplished young Vogel may have escaped with rough treatment and detention only, and that he may return to receive the highest reward which this Society can offer for determining the true position of so many important sites of Central Africa.

Renewed Expedition to the Niger.—From the explorations in Central Africa, which have been progressing from the time of Mungo Park to the present day, let us now turn to the consideration of the expedition which has just been sent out to explore those central parts of Africa, watered by the Niger or Kwara * and its tributaries, and which, recommended to the attention of H. M.'s Government by the Royal Geographical Society and the British Association for the Advancement of Science, is commanded by our associate, Dr. Baikie, who so successfully led the party on the former occasion. Our members will also be glad to hear that this officer is accompanied by the same intelligent surveyor, Mr. May, R.N., who was his companion during the previous voyage up the Chadda or Benué; by Lieut. Glover, R.N., well acquainted with surveying and astronomical observation; by Assistant-Surgeon Davis, R.N., and by collectors of natural history specimens; whilst it is expected that the well-known Church Missionary, the Rev. Samuel Crowther, may also join the expedition on the coast.

The vessel for ascending the rivers is the Day-Spring, an iron screw steamer of 170 tons burthen, prepared by Mr. Macgregor Laird, combining 30-horse power with less than 5 feet draught of water, and arranged to carry three months' provisions and coals for 20 days. The main objects of the expedition as contemplated by the Earl of Clarendon, who has specially patronised and sanctioned it, and as organized by the Admiralty, are to explore the river Niger and its tributaries, to ascertain the natural productions and capabilities of the countries through which they flow, to enter into friendly relations with the native chiefs, to facilitate the return of liberated Africans to their homes, and practically to show the advantages of legitimate trade over the debasing and demoralising traffic in slaves.

Ascending the Niger to Rabbat, and leaving the steamer there, the party will, in the first instance, proceed by land to visit Sakatu,

* Spelt Kwara by Barth and by the Admiralty; Kwora by Baikie, and Quorra by old travellers.

where poor Clapperton died, and there present to the Mahomedan Sultan, to whom they are accredited, a firman from the Porte. After a short stay at Sakatu it is proposed that they should march westerly to Say on the Niger, a populous town visited by Barth in 1854, and thence descend the river by Busa in canoes and rejoin the vessel at Rabba, a tract which may, I apprehend, prove rich in mineral contents. Now, whilst parts of this region have before been traversed by the travellers Park, Clapperton, Lander, and Barth, the first of whom was killed at Busa, the country is still much too imperfectly known to be accurately mapped, though, as we have just seen, Vogel has fixed the site of some adjacent places. Still less are we acquainted with its mineral constitution.

As this expedition, well equipped and well found in provisions, medicines, and presents for the natives, will consist of 12 Europeans and 40 liberated black seamen, opportunities will be afforded of dividing the force and of exploring regions on either bank of the great river. Thus, the Government attaches great importance to the ascertainment of a safe route from Lagos and Abeokuta to Rabba on the Niger, by which the liberated Africans can return to their homes, and extend their commercial habits to the places of their birth. During the period of the next year, when the river is low and the heat great, the party is to seek high and healthy ground near the confluence of the Niger with the Chadda, where it is understood that Mr. Macgregor Laird will establish a commercial station.

When in the interior, however, the leader of the expedition is specially charged to impress upon the natives that the British Government is far from having any desire to establish colonies or settlements which might give umbrage and provoke quarrels, but is solely desirous of promoting such legitimate trade as, in enriching the natives and our own merchants, may effectually check the slave-trade.

A second rainy season will be devoted to the exploration and ascent of the Chadda or Benué, and, as the Day-Spring draws less water than the Pleiad did, it is hoped she may reach a higher point than was attained on the former occasion. It is possible that the fertile region of Adamawa, on the one hand, and Hamarrawa, on the other, may be explored, and even, if opportunity offers, that the higher part of the Old Calabar river in a more westerly meridian may be reached at some point above that to which Oldfield ascended in a steamer in 1836.

Heartily must this Society wish success to such a well-planned

renewal of our intercourse with the more civilised and Mahomedan tracts of Central Africa, which, in addition to the acquirement of important geographical and natural history knowledge, has in view the object so dear to all philanthropists, of encouraging the natives to exchange their natural productions for the manufactures of Europe, and in abandoning their warlike predatory habits to take to the pursuits of agriculture and commerce.

Having taken a deep interest in that former expedition, which, under the command of the same meritorious officer, returned without the loss of a man, I have on this occasion prepared instructions for the geological examination of a region which I apprehend may be found to contain much mineral wealth.

In fact, if the survey be completed in the manner devised, the whole western side of Central Africa will have been so traversed, as to yield two important sections, which cannot fail to give us the knowledge we desire. The Niger, or Kwara, flows in a gorge across such thick ribs of rock as must surely enable the travellers to read off a clear lesson; whilst an excursion from the upper part of the Chadda to the sources of the Calabar on the one hand, and to the heights of Aed Hamarrawa on the other, will also afford an instructive parallel traverse of no less importance.

Rejoicing that Mr. May, the Master, of the Royal Navy, who laid down the soundings and defined the banks of the Chadda, should have returned from Canton, where he has been serving, during the capture of the forts under Admiral Sir Michael Seymour, to rejoin his old companion Dr. Baikie, and confident that they will both of them do all in their power to make geological observations, I must express my regret that there should not have been some one person in this expedition, whose special duty it was to ascertain the true condition of the substrata. For, inasmuch as one great feature of the enterprise is the discovery of sources for future trade, so surely must it be of paramount value to be made acquainted with sites of coal, iron, copper, lead, and gold.

Hoping, however, that the zeal and ability of the explorers may remedy the only deficiency which is observable in the project, I cannot terminate the subject without reminding you of our deep obligations to the Earl of Clarendon for his judicious and liberal support of an exploration which, carried out as it will be by the efficient orders of the Admiralty, must not only advance our favourite science, but will also, I trust, prove a blessing to the natives, and a boon to the commercial world.

The White Nile.—M. Ferdinand de Lesseps has collected, during a recent visit to Khartúm, some information on the present state of the several European settlements along the upper course of the White Nile.

It appears, from his account, that the missionary station of Don Ignacio Knoblecher has attained considerable importance. It is situated about lat. N. 4° 35′, and is above the highest point reached by M. d'Arnaud. A trading establishment has been formed by M. de Malzac among the Djours, at 300 miles west of the river, and between the 6th and 7th parallels of N. latitude, where he collects ivory, and sends it down to the Nile on men's shoulders, the country being too marshy to admit of the employment of beasts of burden.

It will be recollected that, in the Address of our late President, it was mentioned that, according to the opinion of M. Brun Rollet, so long a settler in these parts, the Misselad was entitled to be considered as the main branch of the Upper Nile; but M. de Malzac dissents from this opinion, and regards the Misselad as a tributary, and not as the main river. The question must, therefore, remain an open one, until we shall have received far more accurate hydrographical data about these regions, than we now possess.

Nile Expedition.—I have to notice with regret the failure of an expedition whose object was to explore the still mysterious sources of the White Nile. Organised with method, it was liberally paid for by the Viceroy of Egypt, and placed under the charge of the Count Escayrac de Lauture, a French geographer, previously known to us by his exploration of Soudan. But disunion and want of zeal among many members of his party becoming painfully apparent, that gentleman was unable to proceed beyond Cairo. In the mean time, however, the flotilla was ordered on in advance, and placed under the direction of our countryman Mr. Anthony W. Twyford, an able and adventurous young seaman, who, overcoming all obstacles, had the singular merit of carrying two steamers, upwards of 50 feet in length, and four sailing-boats, over the first, second, and third cataracts, to beyond Dongola! * Having laid in abundance of cordage at Alexandria, and commanding, through a firman of the Pasha, a vast number of the natives (at one time upwards of 3000

* The flotilla was manned by sixty-six native soldiers and sailors, whilst Dr. Ponchet, a physician, and Mr. Clauge, a photographer, were of the party. The largest of the two steamers was left at Assouan.

men), Mr. Twyford so skilfully applied his ropes to the projecting rocks, and so energetically urged on the men, that he reached Dongola in ten weeks from Cairo.

When all the difficulties had been overcome, a messenger reached Mr. Twyford, and, to his great annoyance, ordered him to return, which he did, without loss.

Livingstone's * *Researches.*—Passing now to South Africa, let us see what immense strides have been made since our last Anniversary. Our late President, then speaking of the previous achievements of Livingstone, told us that the undaunted traveller was proceeding to the East to reach the Indian Ocean at Quilimane. But how apprehensive were we that, after all his marvellous escapes, this extraordinary man might still fall a victim to the climate in which so many of our countrymen had succumbed! Great, therefore, was the rejoicing, when those letters addressed to myself arrived, in which he narrated his passage from the interior low country, across the high grounds, and along the gorges of the Zambesi, and the great falls of that river, and announced his safe arrival at the Portuguese settlement of Tete!

Still greater was our joy when he landed on his native shore to receive that hearty welcome which was sure to attend a traveller who, having accomplished such feats, brought us back so much fresh knowledge respecting the interior and flanks of that part of the great continent of which we were previously ignorant.

The outline of the travels of Livingstone is now so generally known to the public, and has been so graphically presented by himself to various assemblies of his countrymen, that any rehearsal of it on my part is wholly uncalled for; the more so, as at the Special Meeting we held on the 15th of December last, in honour of his arrival, I offered those observations which were printed in your Proceedings. Whilst the public is anxiously looking forward to the publication of the details of these journeys, which I have reason to believe will take place in about three months, I will briefly advert to one or two leading features only of them.

The hypothesis I ventured to throw out in what I termed a "Comparative View of Africa in Primeval and Modern Times," when I presided over you in 1852,† that the central regions of

* Since his return to England this traveller has changed the spelling of his name, adopting the form used by his father, and adding the *e* to Livingston.

† Journal Royal Geog. Soc., vol. xxii., Prel. Discourse, p. cxxi.

Africa would be found to be a comparatively low, watery expanse, the rivers issuing from which escaped to the east or to the west through gorges or rents in the subtending higher chains, was proved to demonstration by Livingstone, as respects that vast African river, the Zambesi.

The observations of this great traveller afford also the proof that several of the principal rivers of Africa south of the equator have their sources in comparatively level tracts of no great altitude. Just as the great rivers of Russia are separated at their sources by water-partings of such slight altitude, that Peter the Great connected these diverging streams by canals, so Dr. Livingstone has observed analogous phenomena in the heart of Africa. The African case is, indeed, still more remarkable. In this region Nature herself has made the connecting canal; for flat boats and canoes can pass northwards by the Dilolo river into the affluents of the Congo or Zaire on the west, and into the Zambesi on the east.

These humid regions, particularly towards the west side of the continent, are covered by lofty forest trees, abundance of ferns, mosses, and other plants requiring much moisture. Hence the explorations of Livingstone, opening out such new and unexpected data, induce me to put a question for solution by physical geographers. Why does it happen, that whilst moisture so prevails in lats. 10° to 15° south of the equator, the same districts equally distant from that line upon the north (as touched upon by Barth) should be arid and comparatively dry? After such positive data as those collected by Livingstone, we have indeed no longer occasion to stretch the imagination and suppose the existence of great snowy mountains from which the waters of the Nile take their rise; since we now see that the Zambesi and the Congo are supplied from marshes at lower levels than the chains through which those streams escape. The simple fact is, that in Central Africa there are two copious rainy seasons due to the periodical influence of the sun, the passage of which is accompanied by copious torrents. By the first of these rains the boggy lands become to a great degree saturated, but the water not overflowing, finds no exit in the absence of an adequate declivity. It is only when the whole spongeous mass becomes supersaturated by the second rains, that the waters rising to a great height, furnish the Zambesi with its annual flood.

In like manner the Nile may owe its annual flood to a similar cause—a point which can only be determined when our bold ex-

plorer, Captain Richard Burton, shall have informed us, whether the large Lake of Uniamesi be not the real feeder of the Nile, or if there really be lofty snow-covered mountains under the equator, as descried in the distance by our missionaries.

On this latter point I confess myself to have been to a great degree incredulous; whilst the last observations of Livingstone would lead me to suppose that the Nile, like the Zambesi, is fed from a great interior, boggy, and lacustrine region.

Again, in bringing home specimens of the white dolomitic rocks which constitute the eastern ridge, at a distance of 300 miles from the shore of Africa, and in expressing his opinion that such rocks range far to the N.N.E., or towards Kilimanjaro, the supposed sources of the Nile, Livingstone arrives at the suggestion, that the whiteness of those mountains near the equator, which the missionaries, who saw them at a distance, took for snow, may truly be nothing more than white quartz rocks and crystalline dolomitic limestones, which, glittering under a tropical sun, might well be mistaken.

Let us hope that the journeys now in progress by our clever and adventurous travellers, Captains Burton and Speke, from Mombas or Zanzibar, may settle this problem, and also determine the real nature and extent of the supposed great inland sea, on which our learned geographer Cooley has speculated, and of which the missionaries, Krapf, Rebmann, and Erhardt, have given us a rude sketch-map, compiled from hearsay testimony.

On this and many other collateral points it is not my intention to dilate; for he who would arrive at a sound conclusion must study the writings of Cooley and McQueen, and all the Portuguese authorities, and then collate them with the practical conclusions of Dr. Livingstone, who, having travelled over eleven thousand miles of African ground, and having wandered so long among the sources of the Congo and the Zambesi, is certainly the most valuable witness we can call, when such matters are under discussion.

Great as are the deserts of Dr. Livingstone as a discoverer of new lands, or as a missionary and philanthropist, his real title to the high estimation of the Geographical Society is, that by astronomical observations he has determined the longitude as well as latitude of so many sites, hitherto entirely unknown to us, and has constructed detailed maps of those regions. On this head indeed the language which Mr. Maclear, the astronomer at the Cape of Good Hope, has

used is the most appropriate and truest eulogy which can be applied to our Medallist.*

Having observed in the character of my friend Dr. Livingstone a happy union of simplicity, patience, unruffled temper, and kindness, with the quickest perception, and the most undaunted resolution, I feel persuaded that, vast as have been his achievements, he is still destined to confer great advantages upon South Africa and his own country. His aim, when he returns to Quilimane and Tete, in the spring of 1858, or the first period of the healthy season, and after he has rejoined his old companions the Makololo, who are anxiously waiting for him, will be to endeavour to establish marts or stations beyond the Portuguese colony, to which the inhabitants of the interior may bring their goods for sale, and where they may interchange them for British produce. At these stations, which will be in those flanking, high grounds of the African continent that he has described as perfect sanatoria, he will endeavour to extend the growth of cotton, as well as to teach the natives how to till their lands, taking out with him for these intents cotton-seed, gins, ploughs, &c. He will further endeavour to bring to the English market a vegetable called Buàze, which possesses so tough and fibrous a tissue as to render it of great value even to the natives in their rude manufactures. Specimens of this plant, which grows in profusion on the north bank of the Zambesi, have been converted into a substance that has been pronounced by a leading manufacturer to be worth, when prepared, between fifty and sixty pounds per ton, and applicable to all purposes for which flax is employed. In this material, therefore, alone, to say nothing of indigo, cotton,† beeswax, ivory, and the ores of iron, with much good coal, we have sufficient indication that no time should be lost in establishing a regular intercourse with the natives of so prolific a region.

Thus, acting as the pioneer of civilisation, Dr. Livingstone will first engage the good will of the natives through their love of barter, and, having secured their confidence by honesty of purpose, he will the more readily be able to lead them to adopt the truths of that religion of which he is a minister, and of the value of which his whole life is a practical illustration.

Fortunate is it for our country that we have in the Earl of

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* *See* Proceedings, No. VII. p. 268.

† I learn with pleasure that great success has already attended the endeavours of the philanthropists who have introduced the culture of cotton near Abeokuta, in West Africa, and its preparation for export.

Clarendon a Minister of Foreign Affairs, who not less than the noble Premier has been the consistent and vigorous supporter of every measure tending to root out the trade in slaves; and impressed as our Government is with the desire to sow those seeds of civilisation among the natives, and probably realise the cheering prospect of a great production of the raw material necessary for our manufactures by the independent nations of Africa, let us hope that, whilst the Niger or Kwara Expedition under Baikie, to which I have adverted, is working towards that good end upon the West, the benevolent and enterprising Livingstone, already so dear to the natives, may be sent back to reside among his friends the Makololo, as the "Agent of the Queen of the people who love the Black Man."

AUSTRALIA.

Although there are grounds for believing that in the sixteenth century the Portuguese descried lands which, from their position in old MS. maps, must have been Australia, our own great navigator Cook was really the first to discover, examine, and describe large portions of the coast of this vast continent.*

Afterwards remaining for a long time among the "terræ reclusæ" of the world, this vast region, the interior of which proves to be a worthless desert,† now offers to the world the glorious spectacle of four great British colonies or separate governments on its eastern, western, and southern shores, whilst it pours forth on the old countries of Europe a shower of mineral wealth far exceeding in amount anything hitherto recorded in the history of mankind.

Thirteen years have elapsed since, as your President, I dwelt at some length upon an Australian topic, which seemed to me of paramount importance—the retention of Port Essington, and the establishment of other settlements in Northern Australia. Having lived to re-occupy this Chair, I will revert to the same theme; whilst I crave your indulgence if I previously engage your thoughts for a few moments on another Australian subject to which I have also given some attention—the gold produce of those countries.‡

* An ingenious paper or two have been written to show that the discoveries of Cook may have been based upon a knowledge of those early documents, but in a forthcoming volume of the Hakluyt Society, our Associate, Mr. Major, will demonstrate that such suggestions are entirely fallacious.

† *See* Award of the Patron's Medal, p. lxxxvii.

‡ For the first printed documents relating to Australian gold, *see* the following Memoirs, viz.—Journal Royal Geographical Society, 1844, President's Address; Letter from myself to Sir C. Lemon, Transactions Roy. Geol. Soc. Cornwall, 1846; Letter to the Secretary for the Colonies, 1848; Report of the Nineteenth

If New South Wales has exhibited a diminished supply from most of those tracts which first gave forth their golden abundance, and has only recently been enriched by a small additional quantity derived from a part of Bathurst county, the great coast-chain, bending to the west, and passing from the high level of the Mount Kosciusko of Strzelecki to Victoria, has proved to be charged in certain spots with an amount of gold quite unheard of in any other part of the world.*

The extraordinary rise of the flourishing colony of Victoria is the necessary result of such a vast auriferous produce, and the simple fact, that upwards of 125 tons of gold were sent to Britain in the preceding year, exclusive of local use and exportation to other countries, is so astounding, that a few years ago the mind would have been incapable of measuring the effects which such an enormous addition to the symbol of material wealth might produce upon the destinies of the human race.

Without pretending to statistical acquirements, I formerly ventured to contend that, as the scarcity of the precious metals throughout vast portions of the civilized world had long been a growing evil, and that the hoarding of a substance so easily hidden as gold would continue, and even increase, in countries having unsettled governments, so it seemed to me † that, great as the supply might be, it would not be more than sufficient to meet the demand. The dry river-beds of the old world had, in fact, to be filled up with the golden stream; and experience has now shown us how long it has taken to fill them, and how inadequately they are yet supplied.

But then comes this question. If the present annual amount of supply from Victoria and California should continue, must not a great depreciation of the precious metal follow? Now the answer must be shaped in accordance with unquestionable geological and statistical evidence. Judging from experience, all gold-veins in the solid crust of the earth diminish and deteriorate downwards,

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Meeting Brit. Assoc. Adv. of Science, 1849, &c., Trans. of Sections, p. 60; Quarterly Review, vol. lxxxvii. (1850), p. 429.

* The total produce of New South Wales in 1856 was 138,823 ozs., whilst the returns from Melbourne for the same year give the enormous amount of 125 tons 6 cwt. 6 lbs., or a money value of upwards of 12 millions. My distinguished friend Sir Charles Nicholson, formerly Speaker of the House of Representatives at Sydney, informs me that there can be no doubt that gold is surreptitiously disposed of to a considerable extent (by the Chinese especially); so that the actual quantity of the precious metal produced is probably in great excess of that specified in the official tables.

† Quarterly Review, *supra*.

and can rarely be followed to any great depth except at a loss in working them. Again, as the richest portions of gold ore have been aggregated near the upper part of the original veinstones, so the heaps of gravel or detritus resulting either from former powerful abrasion or from the diurnal wear and tear of ages, and derived from the *surface* of such gold-bearing rocks, are, with rare exceptions, the only materials from which gold has been or can be extracted to *great* profit. These postulates, on which I have long insisted, in spite of the opposition of theorists and schemers, have every year received further confirmation, and seem, on the whole, to be so well sustained as matters of fact, that the real problem we have now to solve is, How much time will elapse before the gold of Australia is finally riddled out of these heaps or basins, or extracted from a few *superficial* veinstones?

It would indeed be presumptuous in any one who had not closely surveyed the rich auriferous tract of Victoria to pretend to answer this question; but I beg my associates to understand, that there is a wide distinction between the measurable capacity of the contents of these broken heaps, or rare thin veinstones *in situ*, and those imaginary mountains with bowels of gold of the theorist, the very thought of which has shaken the nerves of so many fundholders. For, it must be remembered, that all the accumulations of broken golden materials, or the great sources of supply, have well-defined bottoms. They are, in fact, troughs filled in with gravel or shingle, the cubical contents of which, when the country has been thoroughly surveyed, can be computed; and though it may never be possible to predicate the amount of ore contained in all parts of such slopes or hollows, yet, judging from the rate of excavation now going on, a good geologist like Mr. Selwyn, who is conducting the survey in Victoria, may well be able to give us approximate data as to the probable number of years required to empty out the metalliferous fragments from all those troughs or basins in which they have been detected.*

The other sources to which I have alluded, I learn from Mr. Westgarth, an intelligent resident of the colony, have however of late been worked to some profit. These are the narrow veinstones of quartz rock, two or three feet thick, which at the surface are rich in

* A certain amount of the gold of Melbourne, whether occurring in drift or finely levigated clay, is reached by sinking shafts through basaltic coulées, which have evidently flowed in recent times, since they cover woody substances, including cones which, though in a charred or brown-coal condition, have been recognized by Mr. Robert Brown, as belonging to the remarkable Australian living genus, the Banksia, which that great botanist was the first to find and describe.

gold, and which have also been partially worked in California; and so long as the miner is near the surface, these veinstones will unquestionably well repay the cost of working them. When, however, they are followed downwards into the body of the rock, they have usually been found impoverished, either thinning out into slender filaments, or graduating into silver or other ores; so that these insulated thin courses of auriferous quartz—mere threads in the mountain masses—will soon be exhausted for all profitable purposes, when the upper portions shall have been quarried out.

But whatever may be the duration of the gold produce, Victoria has already become a wealthy colony, whose agriculture and commerce have risen to a pitch which will ensure her future greatness, even should the period arrive when her rich golden harvests are no longer to be gathered.

Nowhere in the annals of mankind has there been known so wonderfully rapid a rise, as that which has taken place in and around a spot which, surveyed only a few years ago, was first formed into a separate colony in 1837. In each file of the well-written periodicals of Melbourne, we see pregnant proofs that this spot is already one of the great centres of the world's commerce, and is inhabited by an intelligent and advancing people, well worthy of the parent stock.

The latest accounts from Western Australia, given in the detailed explorations of it, as published in our Proceedings, afford little hope that our colonists are there to be enriched by mineral wealth; the great saline desert which Sturt tracked from south to north, and Eyre travelled upon coast-wise on the south-west, having been met with at several points by Gregory and Austin. Again, rich as is South Australia in her Burra-Burra copper-mines, no material quantity of gold has yet been detected in that colony, notwithstanding some vigorous searches, among which those of Mr. Herschel Babbage have recently been brought to your notice.

Turning, then, from that knot of elevations which, forming the background of Victoria, are so prolific in gold, and exploring that long Eastern Cordillera which leads from New South Wales to the Gulf of Carpentaria, though we may meet at intervals with an auriferous patch or two to entice the explorer northwards, the real incitement to new settlers is found in the rich soil and the good herbage they fall in with, as they extend civilization northwards. Thus, from the clear and accurate survey of the vast Peel River settlements by that sound mining geologist, M. Odernheimer, we now

know that no valuable amount of gold is to be found there, either in the loose débris or in the solid rocks. Independently, however, of gold, the northern progress of civilization, as far as skill and energy can aid it, will assuredly be secured upon a solid basis by the present enlightened Governor-General Sir W. Denison.

The exploration of that eastern Cordillera, so long ago undertaken by our enterprising associate Count Strzelecki, to which I specially directed your attention in 1844, and which has since been carried further out by Leichhardt, Kennedy, and Mitchell, has recently had its northern and north-western offsets brought more definitely into notice by Gregory and his associates.* The advanced guard of the colonists has now even crept on so far beyond Moreton Bay, as to be already within about 560 miles of the head of the Gulf of Carpentaria; and judging from the fertile nature of most of the unoccupied lands, the period is doubtless not very distant when our countrymen will reach that great haven, which, penetrating for 500 miles into the continent, will surely, in future ages, be crowded with ships carrying on a great commercial intercourse between Australia and the Eastern Archipelago, Hindostan, and China.

Looking to that future, and even to our present interests, it was a subject of regret to many of us, that it should have been thought expedient to discontinue the occupation of Port Essington, and to abandon all intention of holding any other station along the northern coast of this vast continent. Unable now to enter upon a consideration of what bay of the eastern side of the Gulf of Carpentaria may be selected as an "entrepôt," I have little doubt that the time will soon come, when all minor difficulties will disappear before the energy of British colonists, in their endeavours to connect their Australian possessions with the rich marts of the Eastern hemisphere.

In treating this subject there is, however, another point which seems to me of such incalculable national importance, that I must beg your permission to say a few words upon it. If the idea of forming settlements through convict labour is to be discarded as respects the Gulf of Carpentaria, because the free population of New South Wales is advancing towards that great haven, then let us turn to that noble bay upon the north coast, of which Cambridge Gulf forms the western side, and whose eastern side receives the waters of the Victoria River. First explored by Philip King in

* Award of the Gold Medals, *ante*. No auriferous tract appears to have been discovered by Mr. Gregory's party.

1819,* and by Wickham and Stokes in 1839, the basin of the Victoria was recently the scene of the encampment of Gregory, whence he extended his researches southwards to the saline desert, and eastwards to the Gulf of Carpentaria. The real opinion of such an experienced colonist and geographer (whose merits have been already dwelt upon in conferring upon him our Founder's Gold Medal) is of infinitely greater value than those speculations which would describe the whole of that region, on account of its latitude, as unfit for the settlement of the Anglo-Saxon race! The plain answer to this view is, that on the banks of the navigable river Victoria, the party of Wickham and Stokes were perfectly healthy in 1839; and that recently our countrymen were stationed there for nine months without the loss of a man. Our medallist Mr. Gregory, after a residence of many years in Western Australia, has thus written to his friend, the former Governor of that province:† "This portion of Australia far surpasses the western coast both in its fertility and extent, and its capabilities for settlement. Good harbours are numerous along the coast, and there is abundance of fine country for stock and cultivation." Again, he says: "The valley of the Victoria far exceeds the best parts of Western Australia both in fertility and extent."

Let us also hear what Dr. Ferdinand Mueller, the botanist of the last expedition, says. This gentleman, who, by his Australian researches, has, according to Sir W. Hooker, placed himself in the front rank of botanists, having collected in tropical Australia about 1500 species of plants, of which 500 are new, thus writes to his friend Mr. C. Latrobe, the former Lieut.-Governor of Victoria:— "North Australia, with the exception of the east coast, possesses essentially a *dry Australian*, and not a *moist Indian climate. Fevers do not therefore exist*, and we escaped such jungles and swamps as those in which Kennedy's party exhausted their strength. There

* As these pages are passing through the press, my valued friend Dr. Fitton called my attention to his Appendix to the Voyages of that admirable surveyor the élève of Flinders, Capt. Philip P. King, along "Intertropical and Western Australia" (1826). I have communicated the letter of this eminent geologist to the Society, and the readers of our Journal will see in it an able effort to derive generalizations from the examination of specimens collected by King and the trend of the rock masses.

These descriptions of King and Fitton should be compared with those of Grey and Lushington, who in 1837 examined that portion of the north coast between Prince Regent River and the Glenelg, and also with the more recent observations of Mr. J. Beete Jukes, as given in his work entitled 'Sketch of the Physical Structure of Australia' (1847).

† Captain Fitz Gerald, R.N.

is abundance of good country in North Australia, and, with access for vessels to the lower part of the Victoria, full scope for the formation of a new colony. But as a new settlement can scarcely be formed in such a remote and certainly hot part of the globe without prison labour, against which the public mind is turned with such decision, and as, without great inducements, the squatters will find it for a long time unprofitable to migrate in this direction, I fear that the pastures of North Australia will yet be left flockless for a long time." *

With such facts before them, it is possible that our Government may see that this prolific and healthy region, *so remote and so entirely cut off by the great interior saline desert from all our established colonies, that no intercommunication can possibly take place,* † is, notwithstanding its summer heats, a perfectly fit and proper receptacle for our convicts, whose labour there would completely repay their cost of maintenance. When our prisons are crowded, and crime is rapidly augmenting with our increasing population, it does indeed seem desirable to seize upon such a zone of exile as is here offered, and, by removing worthless characters from our land, render them really useful in occupying the only coast of that continent on which the British flag does not now fly, though it has been there twice unfurled. But I forbear to press this feature of a topic which can be better handled by politicians; and all I venture to urge is, that, whether by forced ‡ or free labour, North Australia should be colonised.

When presiding over you in 1844, and in then expressing an opinion from the best authority § that, if our Government would

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* Mr. Elsey, the surgeon of the expedition, who has reached London whilst this Address is passing through the press, completely confirms this view of the productiveness and healthiness of the region.

† *See* Grounds of the Award of the Patron's Gold Medal to Mr. Gregory, and a description of these tracts.

‡ It has indeed been stated, that the inhabitants of the free colonies of Australia protest against any further transportation to that continent. Now, a resident of Victoria in S. Australia might with as much consistency declare, that there should be no penal settlement in any part of the world, as that the *Victoria of North Australia* should not be so first settled through convict labour; for the great interior saline desert more completely separates the northern from the southern region of Australia than any sea. That desert is utterly impassable by human efforts, and any convict who should escape from Victoria River or Cambridge Gulf would have to find his way by upwards of 4000 miles of sea voyage before he could reach Melbourne! It is indeed extraordinary that in the debates upon this subject, no allusion has been yet made to Cambridge Gulf and the rich basin of the Victoria river. *See* Debates H. of Commons, May 15, 1857, when Mr. Baxter quoted the Melbourne Correspondent of 'The Times.'

§ Journal Roy. Geogr. Soc., vol. xiv., President's Address, p. xcvii.

render Port Essington a permanent and independent colony, rich mercantile houses would at once set up establishments there, and freight large vessels to trade with the Eastern Archipelago and China, I wrote in the full conviction that, even if that particular station should be abandoned because it was exposed to tornados, other sites could be selected in a region, which so many experienced naval officers and other authorities have eulogised as offering capacious harbours and a climate not unsuited to Europeans—lands in which the pastures are magnificent, whilst the sea swarms with the finest fishes.

In the face, then, of these evidences, is the state of indifference of our country to North Australia to continue? Is Britain not to commence the formation of a settlement, whether by penal servitude or free labour, in the fertile basin of the northern Victoria or elsewhere, and thus secure future entrepôts for her commerce? What better guarantees can be had that success would follow, than the fact, that in the worst and most exposed part of this region (Port Essington) a British garrison was in a healthy state for several years, and that in its more southern portion the explorers in two expeditions have equally preserved good health?

Lastly, looking to the future destinies of our country, is it to be forgotten, that France has recently taken possession, not only of that New Caledonia which our own Cook discovered and named, but also of the Isle of Pines, where our colonists from Sydney carried on a trade in sandal-wood, and has thus acquired a "point d'appui" on the eastern flank of our largest Australian colony?

Or, ought we to close our eyes to the vast importance not only of securing good harbours of refuge in Northern Australia, but also of there establishing naval stations, which would prove invaluable for steam navigation, and where, in the event of war, our fleets may rendezvous, and thence move directly upon the flank of any enemy, who might be operating against our Eastern trade and possessions?

In short, it is scarcely possible to point to any region of the globe where British occupation is so imperatively called for, whether as a precaution, or with a view to future commercial interests. Expressing, then, an earnest hope that a settlement may be soon established on the banks of the Victoria, and in the adjacent Cambridge Gulf, and believing that great national advantages must follow, let us trust that, if such a consummation be attained, the proposers of it may not be forgotten, and that it will be remembered that the last

North Australian expedition, now happily completed under the direction of Her Majesty's Government, was a child of the Royal Geographical Society.

NORTH AMERICA.

British Possessions.—The gradual advance of civilized man towards the remoter regions of North-western America, has long drawn the attention of geographers to those extensive tracts, still distant from the settled country, which afford an almost undisturbed asylum to the aboriginal population of the continent. It would scarcely be credited, that within the limits of British America, a region including at least 112,000 square miles, extending from the head waters of the Assiniboine River to the foot of the Rocky Mountains, and from the northern branch of the Saskatchewan to the 49th parallel of latitude, our boundary with the United States, has remained almost completely unexplored.

The comparative scarcity of fur-bearing animals in this portion of the territory of the Hudson Bay Company, the warlike character of the Indians, and other causes, have alike contributed to prolong our ignorance of lands which may, at no distant time, become the home of thousands of our countrymen.

Mr. Palliser, a traveller, who had already spent a considerable time in the neighbouring districts of the Upper Missouri, and whose adventures as a sportsman form the subject of a popular work, conceived the project of employing two years in the exploration of the tract to which I have referred, along with the adjoining portion of the Rocky Mountains.

Mr. Palliser's original intention was, as I have understood, to undertake this journey at his own expense and with no other companions than those whom he might engage as voyageurs and hunters to join him in traversing the Indian territory. Having, however, addressed himself to our Secretary, his proposal was at once brought before the notice of the Council, by the direction of which it was referred to our Expedition Committee and fully discussed. In consequence of this a letter was directed by myself on the 6th of January to the Right Hon. Henry Labouchere, the Secretary of the Colonies, in which the Council strongly advocated the exploration of that portion of British North America between the parallels of 49° and 53° N. latitude and 100° to 115° W. longitude. The chief objects of the exploration were then stated to be—

1st. To survey the water-parting between the basins of the

Missouri and Saskatchewan; also the course of the south branch of the Saskatchewan and its tributaries.

2nd. To explore the Rocky Mountains, for the purpose of ascertaining the most southerly pass across to the Pacific, *within the British territory.*

3rd. To report on the natural features and general capabilities of the country, and to construct a map of the routes.

Mr. Palliser's experience, his success in conciliating the good will and respect of the Indians, and his anxiety to make his journey conducive to the increase of scientific knowledge, pointed him out as well fitted to be the leader; but it was evident that without the aid of fellow travellers trained to accurate research and accustomed to the use of scientific instruments, no very accurate results could be expected from the expedition.

After considerable discussion, the Lords of the Treasury consented, on the recommendation of the Secretary for the Colonies, to submit to Parliament a vote of 5000*l.* for this purpose, on the understanding that all the collections and results of the expedition should be placed at the disposal of Government.

Three scientific gentlemen have been since appointed to the expedition—Lieutenant Blakiston, of the Royal Artillery, on the recommendation of the President of the Royal Society, to conduct the astronomical and physical observations; Mr. Bourgeau, an experienced and successful botanical collector, selected by Sir William Hooker, the Director of the Royal Garden at Kew; and Dr. Hector, a medical gentleman recommended by myself on the score of his geological and zoological acquirements, as well as for his general fitness to contribute to the objects of the expedition.* Mr. Palliser is, moreover, himself conversant with the use of the instruments which have been supplied by Government, and has the advantage of an experienced assistant as his Secretary; so that the important object of determining the geographical position of the points visited by the expedition has been amply secured.

The instructions given to Mr. Palliser by H.M. Secretary of State direct, that the journals of the expedition, together with the records of the observations, shall be made out in duplicate, and that one copy shall be transmitted to England, from time to time, as oppor-

* General Sabine has instructed Lieutenant Blakiston in making magnetical observations, a Committee of the Royal Society furnished the necessary instructions in physical science, and the geological suggestions were supplied by myself.—R. I. M.

tunities may occur. An assurance was also given that the journal of the expedition shall be regularly communicated to this Society, according as it shall be received at the Colonial Office.

The departure of the expedition was somewhat delayed by the severe illness of Mr. Palliser, but he sailed with his companions on the 9th of May, and information has been received of their arrival at New York in good health and with their instruments in working order.

During the present season it is intended that they should proceed from Fort William on Lake Superior to Lake Winnipeg and Fort Garry, examining *en route* some portion of the watershed between Lake Superior and Rainy Lake. From Fort Garry the expedition will proceed westward to the head waters of the Assiniboine River, and will explore some portion of the country between the southern branch of the Saskatchewan and the boundary of the United States, turning to the northward to winter at Carlton House Fort.

The summer of 1858 is to be employed in traversing the country of the Blackfeet and Blood Indians, between the two branches of the Saskatchewan, tracing the southern branch to the foot of the Rocky Mountains, and in endeavouring to settle the disputed question as to the existence of a practicable pass in the chain, between the Kootaine Pass south of the 49th parallel, and the Pass between Mount Brown and Mount Hooker, more frequently used by the servants of the Hudson Bay Company.

Apart from the public interest which belongs to the exploration of a large and important portion of British territory, it is impossible not to anticipate valuable additions to natural science from the united labours of the members of this expedition, and to feel proportional satisfaction, that Government should have seen the propriety of complying with our recommendation by fitting it out in an efficient manner.

Let me add, that the establishment of a direct line of intercourse between our Canadian possessions and Vancouver Island, which being 250 miles in length, contains good ports and valuable coal-seams, is not the least important of the national interests connected with this survey.

United States.—The omission at our last anniversary of the progress made in the Coast Surveys of the United States was owing to the circumstance that the Reports of it had not been received. Since that date, however, the Society has received from Professor A. D. Bache, the Superintendent of the Coast Survey, the Report

for 1854 of the progress of the department under his very able guidance. This great work has been so often mentioned with praise in former Addresses from this chair, that it is unnecessary for me to do more than direct the attention of all geographers to the continued activity and effective practical efforts of Professor Bache and his assistants.

The report on the United States Coast Survey for 1855, has, I regret to say, not yet been received. I hope, however, at our next Anniversary, to be enabled to do full justice to the advances in this department, and the other branches of geographical science which are in progress in the United States.

The eighth volume of the excellent 'Contributions to Knowledge' published by the Smithsonian Society has been received, and comprises most valuable papers by Mr. S. F. Haven, Professor Olmstead, Major Alvord, Dr. Jones, and Mr. Torce, to which I beg particularly to refer.

The American Geographical and Statistical Society—established at New York in 1854, under the presidency of the celebrated historian Bancroft—has now become a numerous and important body. I refer with gratification to one of the pamphlets which this Society has recently published, entitled 'A Report on Recent Discoveries in Sub-Oceanic Geography.' Referring to the data gathered by our Associate, Lieutenant Maury, in the Hydrographical Department at Washington, this Report as put forth by Mr. W. H. C. Waddell, U.S.N., points to the observations of Commander Rodgers, on the temperature and specific gravity of the waters of the Arctic Ocean at various depths; showing that near the surface the water is warm and light, at mid-depths cold, and at the bottom warm and heavy. This discovery, it is inferred, furnishes the only link that seems to have been wanting to complete by facts, the theory of open water in a really polar sea, as originally suggested by General Sabine, and as since supported by De Haven, Kane, and other Arctic voyagers.

Then, again, the deep-sea soundings of Lieutenant Brookes demonstrate that the most profound repose prevails at vast depths, the bottom being found to be of a down-like softness, and composed in most parts of the skeletons and casts of microscopic shells and infusoria.*

* The details of the zoological results afforded by these operations between America and England, as conducted by Lieutenant Berryman, are reserved for future publication.

These observations, so important to the physical geographer, mariner, and naturalist, when combined with the experiments of Professor Morse, led the way to the formation of a company to construct that wonderful telegraphic cable of which I have elsewhere spoken, whilst the wind and current charts as registered in the United States have enabled speculators to select the best line for paying out the electric cord, which, scarcely thicker than a finger, is to connect the New World with the Old.

I must further refer you to the Report of the American Geographical Society for most curious information, as derived from the microscopic examination by Professor Bailey of West Point, of certain unabraded particles brought up from vast depths, which being ashes of volcanic origin, afford fine scope for the speculations of the geographer and geologist respecting the currents by which such materials may have been carried to their present tranquil abode.

One of the most striking works which the American Government has published in the last year is Commodore Perry's 'Narrative of the Voyage of the Squadron under his orders to China and Japan.' This work is replete with valuable geographical and ethnographical notices of the tracts visited, and is illustrated by many explanatory maps and lithographs. It was transmitted to us by that eminent scholar of the United States my friend Mr. Edward Everett, so justly valued by every man of science and letters in our country.

The question of the priority of discovery of the Bonin Islands, so amicably discussed between Commodore Perry and my predecessors the Earl of Ellesmere and Admiral Beechey, has, I trust, at length been settled by the memoir on those islands published in the last volume of our Transactions.

Geographical progress in the United States has been farther marked by the production of two maps of North America by the distinguished geologist Professor Henry Rogers, as brought out by Mr. Keith Johnston, of Edinburgh. One of these is purely a geographical map, on which the strait boundary lines of the different States, as marked by strong colours, necessarily interfere with the natural features of the country. The other, on the contrary, being a geological map, is a representation of ancient nature, in which the author's peculiar talents shine forth; and the masses of land, independent of the shackles which the interests of man have imposed upon them, stand out in all their simplicity.

Our library has also been enriched since the last Meeting with

a work by Captain Randolph B. Marcy, of the U.S. 5th infantry, on his exploration of the Red River of Louisiana, in which he was assisted by Captain George B. McClellan, of the U.S. Engineers. The book is accompanied by reports on the natural history of the territories visited by the expedition, and also by two valuable maps of the country between the frontiers of Arkansas and New Mexico, and of the tract embraced within the basin of the Upper Red River.

Mr. J. G. Kohl, the industrious labourer in the field of statistical research, whose works on Russia and other countries have obtained for him due consideration, has now entered upon the illustration of the geography of America, and, as a prelude to labours which he hopes will be found useful, has just published a little treatise under the title of a 'Descriptive Catalogue of those Maps, Charts, and Surveys relating to America, which are mentioned in Hakluyt's Great Work.'

Though the last session of Congress was the short one, or from December to March only, the subject of geography was not neglected. Adequate grants of money were made for the publication of the surveys of the Expedition to the North Pacific Ocean and Behring Strait, and for finishing the publication of the Charts made by the late Expedition for the Exploration and Survey of the River la Plata and tributaries, as well as for an Exploration of the Paraná and the tributaries of the Paraguay River.

I am also informed that towards the verification of the Survey of the Atrato and Truando Rivers in New Granada, as proposed by Mr. Kelley (see last Anniversary Address, p. ccxxii.), for the purpose of making a ship canal between the Atlantic and Pacific Oceans, Congress has liberally granted 25,000 dollars. It has also, I am happy to say, been intimated, that the Governments of Great Britain and France are not unwilling to assist in this very important preliminary Survey.

Central America.

The communication by canal between the Pacific and Atlantic, to which my predecessor called attention, has a much better chance of being investigated, now that all the states of Europe are at peace, and that the most friendly relations possible exist between the Governments of the United States and Britain.

The Proceedings record how favourably the project of Mr. Kelley of New York was entertained by this Society, and show how deep an interest we take in realizing the early anticipations and wishes

of the illustrious Humboldt. I can only say that no exertion on my part as the President of this Society shall be wanting, to support any proposal which may be made to bring about such a simultaneous and conjoint Geographical Survey made by the Governments of Britain, France, and the United States, as shall definitively settle the points at issue, and demonstrate whether or not it be practicable to execute a great inter-oceanic canal.

SOUTH AMERICA.

New Granada.—Captain Battersby, who has been lately travelling in New Granada, strongly advocates the superior commercial advantages of the River Atrato over the Magdalena as a channel of communication, not only with the people on the upper waters of that stream, but with those of the extensive districts bordering the Cuenca, and of the cities of Antioquia and of Cartajo, the population of which alone he estimates at 30,000; expressing his belief that ere long the traffic on the Atrato must be carried on by steamers, and that then the Gulf of Darien will become the centre of nearly all the commerce of New Granada.

It appears that, in the course of the last year, two steamers, drawing 7 feet water, did ascend the river as high as Quibdo, the capital of Choco. British goods destined for that place are now sent round Cape Horn to the Bay of Buenaventura, and have to be carried thence on mules across the Andes.

Chile.—M. Plessis has completed his map of the province of Santiago de Chile, coloured geologically, a copy of which has been received by the Society, through the kindness of Mr. Bartholomew, who has engraved it.

Those who wish for the latest data on the geographical and other statistics of that section of South America will find them in the *Annuario Chileno*, a yearly publication which contains much useful local information, and in the *Anales de la Universidad*, another periodical, principally edited by M. Domeyko, a well-known geologist and good observer.

Peru and Bolivia.—Mr. Bollaert, our associate, has drawn attention to the existence of a statistical account of *Peru*, published in Lima by Don J. M. Cordova y Urrutia; as well as to a similar work on *Bolivia* by Don José Maria Dalence of Chuquisaca; both of which, if translated, he thinks might be useful to parties interested in those countries.

Rio de la Plata.—Lieut. Page's preliminary Report has been pub-

lished '*On the Exploration and Survey of the Rio de la Plata and its Tributaries*,' noticed in Admiral Beechey's Address last year.

The United States' steamer Waterwitch was employed on the service in question for more than three years, during which the Paraná and Uruguay, the principal affluents of the Plata, were explored, and the river Paraguay ascended as high as the Brazilian fort of Coramba, in lat. 19° S. From that point the further progress of the vessel was not permitted by the ruling powers, much to the disappointment of Lieut. Page, who hoped to have led the way in opening a communication by steam for the first time with the rich provinces of Matto Grosso and Cuyaba, on the higher waters of this magnificent river.

There must, doubtless, be a great mass of new information to be collected respecting those countries which, under the Colonial rule of their old masters, were closed to all the rest of the world; and we cannot, therefore, but join in anticipating a rich harvest of interesting matter respecting them whenever the further details of the expedition shall be published in extenso, as no doubt they will be ere long, conformably to the liberal and enlightened practice of the Government of the United States.

It is, however, but due to others, when treating of this subject, to mention that the rivers Paraná and Uruguay have been already very carefully surveyed by our own officers, and that Captain Sulivan's admirable charts of them, upon a large scale, were long ago published by the Admiralty under the superintendence of that eminent hydrographer Sir Francis Beaufort.

Those rivers, as well as the Paraguay throughout its course, had been also previously mapped (and, it may be inferred, with some accuracy) by commissioners eminently qualified for the purpose, who had been chosen by the Courts of Spain and Portugal to settle and define their respective rights and limits, in virtue of the treaties of 1750 and 1777, and whose labours on the last occasion extended over a period of no less than twenty years.

The portion of them best known, perhaps, is that connected with Paraguay, in which every place of any importance was fixed by astronomical observation, as may be seen in the well-known work of Azara, who was one of the Spanish commissioners.

Copies of many of the maps of that part of this grand survey were purchased some time ago by the British Museum, and may be referred to in the MS. Department.

The most important result of Lieut. Page's expedition as yet

made known, is the exploration of the River Salado, a tributary of the Paraná, with the evidence adduced of its being navigable in the greater part of its course through the upper provinces of the Argentine Confederation. This has been since verified to a considerable extent by the passage down the river of a boat from Matará,* in the province of Cordova, to Santa Fé, on the Paraná, under the personal guidance of Don Antonio Taboada, a brother of the Governor.

M. Amedée Jaques, a French gentleman, who joined Lieut. Page in his journey into the interior, to explore the course of this river, has published in the 'Revue de Paris' (last March) a highly graphic account of the personal adventures of the party, and of a bloody conflict they had with the wild Indians in the Chaco.

Coast of Patagonia.—Mr. Bragg, an English engineer employed at Buenos Ayres, has discovered and surveyed a good port and roadstead near the old settlement of the Jesuits, in the vicinity of Cape Corrientes, to the south of Buenos Ayres, which had hitherto escaped notice, but which is likely to be of some importance as a place of export for the produce of the adjoining districts. The details respecting it have been forwarded to the Hydrographer of the Admiralty.

Orinoco.—At the commencement of the present year, a proposition was laid before the Society by Admiral Sir Charles Elliot, late Governor of Trinidad, for the resumption of Humboldt's scientific investigations on the Orinoco and its affluents.

The prospective estimate formed by the illustrious philosopher of the advantages to be anticipated from the junction of the Tuamini, a branch of the Orinoco, with the Rio Negro, which falls into the Amazon, together with his more earnest advocacy of the importance of the navigation of the Meta, unquestionably place this suggestion in a very favourable light. The region drained by the vast water-system of the Orinoco is described by Humboldt as "enrichi des productions les plus variées;" and though we may no longer look for the fabled El Dorado of the adventurous Raleigh, the hope may yet be indulged that, by exploratory enterprise and the judicious application of steam navigation, a real El Dorado may yet be founded in this fertile portion of the western world. Nor can I here refrain from an allusion to the valuable edition by our dis-

* Sir Woodbine Parish, in the first edition of his work on those countries eighteen years ago, mentioned that the Salado was known to be navigable as high as that place (Matará), and that if it were used, there would be an enormous saving of land carriage in the conveyance of goods from Buenos Ayres to Santiago in the interior.

tinguished medallist Sir Robert Schomburgk, formerly her Majesty's Commissioner to survey the boundaries of British Guiana, of the "Discovery of the Empire of Guyana by Sir Walter Raleigh," printed for the Hakluyt Society in 1848. Having himself explored what he describes as "the wondrous delta of the Orinoco," Sir Robert was able to enter, with the fullest intelligence and zeal, into the reproduction of those elegant descriptions by Raleigh which he had read with so much delight. These early narratives not only charm us by the quaint and nervous language in which the manly exploits of our ancestors are related, but frequently record discoveries or assert important truths which, from those distant times, lie dormant or are regarded as fictions, until accident or science unfolds anew, to the adventurer of the present day, the secret of their existence. I may mention, by way of illustration, an instance of the manner in which a fact of the greatest moment to the interests of the world may thus lie buried for more than two centuries and a half after its distinct announcement by one of our most distinguished early travellers. In the "World encompassed by Sir Francis Drake," edited for the Hakluyt Society by our associate Mr. Vaux, we find it said of California, which then received from Drake the name of Nova Albion, "There is no part of earth here to be taken up wherein there is not some speciall likelihood of gold or silver." This voyage of Drake's was made in 1578, and it was not till 1848 that the whole world was astounded by the discovery of the Californian goldfields.

Observatory of Santiago.—"The astronomical geography of positions (Baron Humboldt writes to me) has made progress through the useful establishment of the observatory of Santiago de Chile, founded during the residence of the able astronomer Lieut. Gilliss, of Washington. The Director of the Observatory of Santiago, M. Moesta, has found the difference of longitude between Santiago and Greenwich 4h. 42′ 32″·4 in time, probable error 3″·2.

"M. Moesta thinks, that all the west coast of South America is 17″ too much to the west on the best maps. I had found that Callao de Lima was 5h. 18′ 16″ west of Paris by the passage of Mercury over the solar disc; now Admiral FitzRoy finds the difference of longitude between Valparaiso and Paris 4h. 50′ 6″·6; and that between Callao and Valparaiso by means of chronometers 0h. 22′ 8″·4; so that Callao would be 5h. 18′ 15″ west of Paris, which coincides to within one second of time with the result of the observation of the passage of Mercury observed by me—an accuracy probably accidental. Admiral Beechey has repeated the calculations of Herz and

FitzRoy, showing that the difference of longitude in time between Valparaiso and Paris is 10″·4 in excess. Callao, therefore, would be only 5h. 18′ 4″·6 to the west of Paris. The passage of Mercury, however, over the solar disc, which was observed on the 4th of May, 1832, at Lima by Mr. Scholz, again gives for Callao 5h. 18′ 13″·7 west of Paris—supposing the chronometrical differences between Lima and Callao, which I published in the second volume of my Astronomical Observations, to be correct. The electric telegraph, established in May, 1855, has given 0h. 3′ 56″·5 for the difference of longitude between Valparaiso and Santiago. M. Moesta, therefore, places Valparaiso in 4h. 55′ 49″·5; and I and FitzRoy 4h. 56′ 6″·6."

After this clear and succinct analysis of so valuable a geographical datum, obtained through an expedition of the United States, the veteran philosopher concludes in these words: "And thus this long endurance of life (cette patience de vivre) has enabled me to witness all these rectifications." *

In looking to the general configuration of South America, I am further reminded by Baron Humboldt, that the trachytic regions form insulated bands in the Cordillera, such as the volcanic Sangai, to the S.E. of Quito, which is constantly throwing out incandescent scoriæ, like those of Stromboli. This insulated trachytic mass, which has a diameter of 45 English miles only, rises out of a granitic and gneissose plateau 16,070 French feet above the sea, thus presenting an analogy to the structure of the Thian Chan in Central Asia.

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* Having been made acquainted by my friend Mr. Pentland with data respecting Admiral Beechey of which I was ignorant, it is due to the memory of my lamented predecessor to state, that in a letter to Admiral Krusenstern, he fixed the longitude of Valparaiso by independent astronomical observations at 4h. 46′ 37″ 6‴, only differing 8″·6 from that deduced by Moesta's observations; and as the latter are probably 3″·7 in error, it follows that there may be little more than one mile between his result and that of Admiral Beechey.[a]

The position adopted on the Admiralty Charts, and in Lieut. Raper's elaborate Tables of Positions, has been deduced solely by means of chronometers during Admiral FitzRoy's surveys; the latter officer having made few absolute astronomical observations; whilst his chronometrical data are entitled to the greatest degree of confidence.

I am also informed by Mr. Pentland, that he having made independent observations, similar to those of Admiral Beechey (moon culminating stars) at stations referred trigonometrically and chronometrically to places on the coast, he found for the latter, longitudes agreeing with those deduced from the position of Valparaiso, as determined by my distinguished predecessor. Thus the position of Arica deduced by Mr. Pentland from observations made at La Paz, and carried on by a series of triangles and chronometers to that place, is identical with that deduced from Beechey's longitude of Valparaiso carried on by FitzRoy's chronometrical chain to the Peruvian port.—R. I. M.—1*st Aug.* 1857.

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[a] *See* Journal R. G. S., vol. ix. p. 502; also Daussy's Positions Géographiques, 1842, p. 67, &c.—ED.

Final Arctic Search.

When I last addressed you as your President in 1853, it was still my hopeful task, as in the previous year, to urge the Government and the country to send out another expedition in search of my old and honoured friend Franklin and his crews. I then congratulated you upon fresh expectations having been raised by the successful voyage of Lady Franklin's little vessel, the Isabel, under Inglefield, and also in anticipation of good results from the large public expedition under Belcher and Kellett. Alas, we know too well what fatalities interfered with the solution of the great problem, so clearly recorded last year by my lamented predecessor. Since this Address was delivered, the light which had been thrown upon the subject, whether by the information and memorials brought home by Dr. Rae, or the exploration down the Back River by Dr. Anderson, has rendered me still more anxious to ascertain the real fate of the Erebus and Terror, and their gallant crews. Through the unexpected tidings communicated by our medallist Rae, we were no longer allowed to speculate on the course followed by Franklin; the "whereabouts" of the journeyings of some, at least, of our missing countrymen being for the first time made known. Had these traces been discovered two years sooner, what efforts would not have been saved to Great Britain and America! All the endeavours of Belcher and De Haven to penetrate northwards by Wellington Channel, as well as those of Kellett to communicate by a north-western course with Collinson and McClure, and the almost superhuman struggles of Kane to reach a Polar basin—all these might have been averted! The daring efforts to penetrate with ships through the intricate channels which separate the great islands of the Arctic Archipelago would have been stopped by that one fact, and the Government would have known how to dissipate at once the mystery which still hangs over the fate of the missing vessels and a large portion of their crews.

Is it, therefore, to be wondered at that many men of science willingly signed a memorial,* beseeching the Government to make a final endeavour to search efficiently the area, at the edges of which

* This document, which was prepared by myself, the list of subscribers being headed by Admiral Sir F. Beaufort and General Sabine, was most kindly received by Lord Palmerston in June, 1856, a month after the last Anniversary of this Society. My predecessors, Lord Ellesmere and Admiral Beechey, were among the subscribers, as well as Lord Wrottesley, who in his last Anniversary Address to the Royal Society handled the subject with great effect. *See* Proc. Roy. Soc., No. IV.

the relics were discovered, and where the Esquimaux reported, that some of the wanderers were last seen? I regret to say that notwithstanding the kind consideration of the Prime Minister, and the hopes we were led to entertain, the limited search asked for has been withheld, and Lady Franklin has once more been thrown upon her own resources, to terminate that inquiry which my friends and associates felt it to be the duty of the nation to complete.

The intense feeling displayed on this subject by our kinsmen the Americans has been demonstrated by the strenuous efforts made by their Government as well as by Mr. Grinnell. In 1853 I rejoiced with you in learning, that this liberal philanthropist was about to renew with his own funds another Franklin search, and that Kane was about to sail on such a voyage. That noble young man, as I have already shown, extended far the northern limits of Smith Sound, at the head of Baffin Bay, and opened out headlands, glaciers, and frozen seas, hitherto unknown to us. This search and all the other trying endeavours were, we now know, made in wrong directions.

If, for example, Collinson had not made extraordinary efforts to force his way to the north-east through packs of ice, but had simply confined his voyage to the channel along the north coast of America, which he found so easy to follow, and by which he brought his ship safely back, and had known that the tract near King William's Land and the mouth of the Back River, the edges of which he actually touched, formed the goal we now desire to reach, the problem would have been for ever solved by him. If, then, there is no obstacle to a renewal of the western route, by Behring Strait and the north coast of America, what difficulty can there be in reaching the north-eastern edge of the limited area sacred to the memory of Franklin, by a ship proceeding to Batty Bay or Wager River, places which our vessels have already reached, and whence they have also returned unscathed? The instructions of Lady Franklin to Capt. Kennedy, the Commander of one of her private expeditions, were, that on reaching that tract where poor Bellot has left his name, a search was to be made south-westwards; and had the suggestion of that clear-sighted woman been followed, she would really have been the first to discover, by her own efforts, the remnants of her husband's expedition.

An ingenious essay, by Mr. Findlay, on the probable course pursued by Sir John Franklin's expedition, which was published in the last volume of our Journal, and in which the directions of the Arctic

currents are delineated, has sustained the idea which I once thought possible, but afterwards abandoned, that the two ships seen floating on an iceberg on the Newfoundland Banks may have been the Erebus and Terror. The same author has recently published an Appendix, in which, supporting his view by letters from parties well acquainted with the seaman who made the observation, he also gives a letter from Captain Ommaney, expressing his concurrence in the same view. With every respect for the opinions of such contemporaries, I cannot yet admit, that the vessels seen floating southwards may have been the Erebus and Terror; nor can I see why they may not have been other vessels. But even if it be granted that the question is to be thus disposed of as respects the ships, it is consolatory to find that both Captain Ommaney and Mr. Findlay strongly advocate a renewed search, to dispel our ignorance of the only region, whose exploration can solve the great Franklin mystery. Whatever may be thought of Mr. Findlay's view of Peel Sound being closed to the south, his suggestion, that the unexplored tract between the south end of Melville Sound and Victoria Strait is the area, which ought specially to be searched, is entitled to the serious consideration of all those who continue, like myself, to take a lively interest in the solution of this problem, and who are bent upon ascertaining, by positive survey, whether no traces of the ships or their records can be found, and also to satisfy us that no survivors are eking out their existence among the Esquimaux. On this last point I can never forget what I heard from the lips of Captain Hartstene himself. After our Sovereign had in December last visited the Resolute, that token of the good-will of the American people, the British Queen inquired, with the right feeling which is her characteristic, if he thought that any of her poor sailors might be still alive, and the gallant officer assured Her Majesty that, in his opinion, such might well be the case.

A strong tendency towards this belief, has indeed gained much ground since the publication of the admirable volumes of Dr. Kane. One passage from that work has been already cited in the brief tribute I have paid to the eminent man, who, when he was himself in dire want and had unexpectedly procured some fresh supplies of animals, thus exclaims: "How can my thoughts turn despairingly to poor Franklin and his crew? . . . . Can they have survived? No man can answer with certainty, *but no man, without presumption, can answer in the negative.*" . . . . "Of the one hundred and thirty-six picked men of Sir John Franklin in 1846, Northern

Orkney men, Greenland whalers, so many young and hardy constitutions, with so much intelligent experience to guide them, I cannot realize that some may not be yet alive—that some small squad or squads, aided or not aided by the Esquimaux, may not have found a hunting ground."

On this subject there has truly been much misapprehension in the mind of the public, owing to their ignorance of the geographical data on which hope is founded. The area within which some of the crews of Franklin were last seen, though much further to the south than the wild islands and headlands of the Arctic Archipelago, in which the Resolute and her companions were abandoned, and though easily and safely approached by sea, either from the west or east, is hopelessly cut off from all land furnishing the necessaries of life, by a broad, cold, and sterile region, occupied by a few wretched natives. The individuals of Franklin's expedition who might have survived, if located to the north among the Esquimaux who fatten upon seals and walruses, could by no possibility track their way southwards over these wilds, on which even the reindeer finds no sustenance. It is chiefly in the meridians on either side of the Back River that this sterility prevails; and here it was that Franklin and his former companions, Back and Richardson, suffered so intensely in 1824, that their existence was then nearly terminated.

With such a wilderness between them and any home, the exhausted crew of Franklin, contemplating nothing but starvation in that sterile icy region of central North America, would naturally, as Kane has suggested, seek a refuge among the Esquimaux, in some chosen spot where animals abound.

When we know from the declaration of a highly respectable seaman still living (one indeed of the crew of Parry),* that he was on the point of embracing the life of those savages, merely for the allurements of the chase and the wild attractions it offered, we can well imagine that those who were left of Franklin's noble crew should, according to the dictates of nature, endeavour in like manner to prolong their existence. Let it therefore be impressed on the public mind, *that although the area, on the southern edges of which some of Franklin's people were last seen, has been approached and can be easily again visited by ships, it has never yet been examined;* † *and also, that though it be to the south of many tracts formerly penetrated, yet is it so cut off by impe-*

* *See* 'Times,' December 20, 1856, Letter from Mr. John Pead to myself.

† Montreal Island, which has alone been visited, is incapable of affording sustenance even to Esquimaux.

*netrable wilds from the nearest parts of North America, in which food can be obtained, that by no exertion could any survivors of the Erebus and Terror be saved except by sending out a well-found ship or ships to the points nearest to such insulated Esquimaux quarters.**

As you are all acquainted with that appeal already mentioned, which my friends and myself thought it our duty to make to our countrymen on this exciting topic, I am sure you will rejoice with me, that the charge of the expedition, which Lady Franklin has resolved to send out, should have been undertaken by the eminently distinguished Arctic explorer, Captain M'Clintock. Commanding a thoroughly adapted screw yacht, the Fox, assisted by a well-qualified Polar associate, Lieut. W. R. Hobson, with Dr. D. Walker as the surgeon, and provided with a picked crew, this gallant officer will realize all that a firm resolve, a clear head, and skilful calculations can effect.

Let it also be recorded in our volumes, that amid the many generous Englishmen who have responded to the call, the name of Captain Allen Young, of the Merchant Service, stands pre-eminently forward; since this meritorious young seaman, who has already commanded large ships in various seas, has not only volunteered his

* Proposals were made by Lieutenant Bedford Pim and Dr. King to combine a land or river journey with maritime exploration; the former having, indeed, communicated previously a long memoir on the subject to the Geographical Society. Applauding those experienced men for their laudable endeavours to rouse public sympathy to continue the search, and reminding my associates that Dr. King accompanied Franklin in a former voyage, and that Lieut. Pim was highly commended by myself and others, not only for his Arctic researches, but also for his devotion to the cause in proposing to reach the supposed scene of disaster, by traversing Siberia, followed as it was by his march across the ice of Banks Sound to rescue M'Clure,—still, looking to the slender results of the recent land-expedition down the Back River, though carried out with all possible energy by Mr. Anderson, I cannot bring myself to believe that the renewal of any such enterprise can have a satisfactory issue. In fact, as we now know it to be impracticable that an exploring land and river party can convey more food in their canoes than will just enable them to make a hasty and wholly ineffectual search near the mouth of the river, all efforts to explore the adjacent northern tracts where those Esquimaux are chiefly living, among whom some of the missing navigators were heard of, must cease just at the moment and on the ground where they ought to be pursued. No exertions, in short, save those which can be made upon the ice by vigorous men proceeding from a well-supplied ship, can succeed in really ascertaining the fate of the crews of the Erebus and Terror. Other memoirs, suggestive of different plans for the most effective search after the relics of the Erebus and Terror, have been recently sent to the Society; thus evincing the great interest still taken by the public in the settlement of this question. These memoirs are: 'On the Discovery-ship Resolute and the Arctic Currents,' by M. Turnbull; 'On the Search for Sir J. Franklin,' by Chief-factor Anderson, communicated by Sir John Richardson; 'Plan of a Search for Franklin Expedition,' by Dr. R. M'Cormack; 'Plan of a future Search for the lost Franklin Expedition,' by James Parsons.

services, under the command of M'Clintock, but has actually subscribed 500*l.* towards the expense of the expedition in which he sails.* May God, therefore, crown their efforts with success! and may M'Clintock and his companions gather the laurels they so well merit, in their noble endeavour to dissipate the mystery which shrouds the fate of the Erebus and Terror and their crews!

If, however, this last effort which, in the absence of other aid save that of her friends, Lady Franklin is now making, should fail in rescuing from a dreary existence any one of our countrymen, and should not even a plank of the Erebus and Terror be discovered —still, for her devotion in carrying out this examination of the unvisited tracts wherein, we have every reason to believe, the ships were finally encompassed, every British seaman will bless the relict of the great explorer, who has thus striven to honour the memory of her husband and his brave companions.

My earnest hope is, that this expedition of Lady Franklin may afford clear proofs that her husband's party came down with a boat to the mouth of the Back River in the spring of 1850, as reported on Esquimaux evidence by Dr. Rae, and thus demonstrate that which I have contended for, in common with Sir Francis Beaufort, Captain Washington, and some Arctic authorities, that Franklin, who in his previous explorations had trended the American coast from the Back River westward to Barrow Point, was really the discoverer of the North-West passage!

In wishing then Godspeed to this private expedition, as I did to all the previous efforts of Lady Franklin, far be it from me to underrate the zealous endeavours which successive Administrations have made during a series of years, whether to extend geographical knowledge and determine a north-west passage, or more recently to rescue Franklin and his crews—endeavours which will be recorded as among the great glories of Britain, in having brought forth in striking relief the characters of some of the ablest of our seamen, who, formed in that school of severe trial, have proved to be leading men in the late war. These British worthies have now been

* I am happy to announce that, whilst these pages were passing through the press, Petersen, the Esquimaux interpreter, well known to all the readers of the voyages of Penny and Kane, having returned from Greenland to Copenhagen, has, through the instrumentality of our distinguished foreign member Captain Irminger, Royal Danish Navy, and a telegraphic communication from myself, travelled through London and reached Aberdeen in time to join Captain M'Clintock. The Fox sailed from that port under Lady Franklin's eye on the 1st July, the whole party on board in the highest spirits.—*July* 4, 1857.

appropriately rewarded by having had conferred on them their hard-earned Arctic medals; and I only regret that their noble feats should not, for the honour of the nation, have been terminated by one exhaustive public effort.

My admiration of these voyagers has indeed been recently enhanced, by the ardour and sincerity with which so many of them have offered their services, to continue the search after the relics of the Erebus and Terror. Such men are truly worthy of any distinction which their country can bestow, and all geographers must agree with me in regarding the Arctic medal which they wear, as an honour second to none which the Sovereign can confer.

Conclusion.

In bringing this discourse to a close I have now only to congratulate my associates on the steady rise which this Society has made in the estimation of the public, and on the vast accession to its members in the last few years. Commencing in a striking manner under the guidance of Admiral Smyth, and increasing during the successive Presidencies of myself, the Earl of Ellesmere, and Admiral Beechey, the augmentation has so continued, that we now nearly double the number of members at which we stood during many years.

Besides the vast augmentation of our Map Office, another distinctive feature in our recent progress has been the periodical publication of our Proceedings, which, whilst they record the doings and sayings at our evening meetings, sustain the spirit of the Society, and serve to keep the members, who have been unable to attend our meetings, well acquainted with the passing events.

Putting forth the substance of what is spoken as well as read, these periodical reports impart vitality to our Society, and will in future times be consulted with interest, as expressing the current opinions of British geographers and travellers "de die in diem;" a result for which we are mainly indebted to our able and zealous Secretary, Dr. Norton Shaw, who, in addition to the editorship of our Journal, has recently taken upon himself the whole of the editorial duties connected with this new publication.

Whilst the masses of our countrymen, it must be admitted, are better pleased with the news of the day, than with scientific discussions, many of the topics of which we treat are so popular, as well as important, that an enlightened portion of the press merits our best thanks for endeavouring to do justice to the promotion of those geographical researches in which we are embarked. It would be truly surprising if this were not so amongst Englishmen, whose

colonies extend to the Antipodes; and who have, therefore, more grounds than any other nation, for making themselves well acquainted with the surface of the earth, its productions, and inhabitants. I rejoice then to see that our numbers have so increased since my last Presidency, that adequate as we then thought the present apartments would prove for our wants, we already find that they will not by any means contain our members. Assisted, however, by Her Majesty's Government with an annual grant for keeping up a public Map Office, and enjoying a good balance at the banker's, there can be no difficulty in remedying this temporary inconvenience; and when the next Anniversary arrives, I trust that we shall be assembled in halls well adapted to accommodate us, including those ladies also who, following the example of their illustrious countrywoman, Mrs. Somerville,* take a deep interest in geographical science; for there is nothing more encouraging than to see the fair sex gathering information amongst us, to be by them communicated to the sons of England.

At the same time, whilst we maintain our popularity, we must render our annual Journal as far as practicable, not merely the exponent of interesting travels, but also the index of the progress of physical and comparative geography strictly so called, since we reckon amongst our associates, men who are competent to realize every wish to which the scientific geographer can aspire.

In thanking you, Gentlemen, for your friendly support, let me say, in conclusion, that when I undertook to stand in the breach occasioned by the death of my gallant friend Admiral Beechey, I did so under the persuasion that I could not execute more than one session of labour, considering that I had other scientific and official duties to perform. Feeling, however, that I may still be able to serve you for another year, I have, in compliance with your flattering request, consented to retain that which I consider to be as distinguished and useful a post as a man of science can occupy.

* In announcing that a new edition of Mrs. Somerville's remarkable work on Physical Geography is about to appear, I am happy to be able to state, that whilst we are taking measures to secure a permanent meeting-room, the Senate of the University of London and the Council of the Royal Society have acceded to the request of the Council of our Society, and have granted us the use of the large rooms at Burlington House for our ordinary meetings during the ensuing Session.—*July* 12, 1857.