

member. In the mean time many salient and characteristic anecdotes of him having been chronicled in periodicals,* my present aim will be confined to a brief sketch of his career and the record of those incidents which directly connect him with the Geographical Society.

Born in the year 1774, young Beaufort owed his first instruction in geography to his father, the vicar of Collon and rector of Navan in Ireland, who made one of the earliest good maps of that country. Entering as a cadet in the East Indiaman *Vansittart*, he assisted in surveying the Strait of Banca, and narrowly escaped death after shipwreck. Serving successively in different ships of the Royal navy, he took part in Lord Howe's memorable victory of the 1st of June, 1794, and acting under Admiral Cornwallis was present in his celebrated retreat of the 17th of June, 1795, and assisted in the capture of many privateers and other ships of the enemy. On the coast off Malaga, he afterwards captured the Spanish polacca *San Josef* when protected by batteries and a privateer by boarding her from boats; not, however, without receiving many wounds, for which splendid service the young Lieutenant was rewarded with the rank of Commander. From that period (1800) until he obtained the step of Captain in 1810 he was busily employed in convoying fleets to India, partaking in the expedition to the Rio de la Plata in 1807, or hovering round the enemy's ports in Europe. In command of the fine frigate *Frederikstein*, he surveyed the south coast of Asia Minor from 1810 onwards, and afterwards gave to the public that remarkable work 'Karamania,' which holds so high a place among our standard writings on geographical and antiquarian science. While on the survey of that coast he was badly wounded by a Turk, but was still enabled to complete his work so as to supply excellent charts for the Admiralty of the coast of Karamania. After some interval our deceased member was appointed in 1825 to the post of Hydrographer, which he filled with unrivalled success until two years before his decease, when his advanced age and infirmities compelled him to resign, to be succeeded by his distinguished *élève* Captain Washington.

In reviewing the useful and practical life of Beaufort, it can truly be said that during 26 years he so directed the Hydrographical Office that it became the model which all other governments sought to follow. It was indeed gratifying to men of science to see the

* See particularly a lively and characteristic sketch of Sir Francis Beaufort, *Daily News*, January 15, 1858.

friend and companion of Wollaston, of Young, and of Davy placed at the head of the Scientific branch of the Navy—not as a mere servant of a Board, but as a man with mind and energy to think and act for himself. Nor was it long before proofs of his influence and activity became visible. Seconded by an able staff of surveyors, proud to serve under one so competent to appreciate their labours, he soon gave them occupation. FitzRoy, worthy pupil of such a master, was despatched to complete the survey of South America; Belcher, Kellett, and Wood were sent to examine the south coast of Central America and of Mexico; Vidal, Denham, Skyring, and Arlett were charged to complete the west coast of Africa; Blackwood and Owen Stanley, names dear to every lover of science, undertook the survey of the north-east coast of Australia and of New Guinea. Sullivan went to the Falkland Isles and the river Plate, Stokes and Drury to New Zealand, Bate to Paláwan, Belcher, Kellett, and Collinson to China, Owen and Barnett to the West Indies, Bayfield and Shortland to the St. Lawrence and Nova Scotia, Graves and Spratt (the pupils of Mediterranean Smyth) to the Greek Archipelago, Hewett to the North Sea, Beechey to the Irish Sea, while many others spread their labours over different portions of the coasts of the United Kingdom. Forbearing on this occasion to expatiate on the merits of the many distinguished and zealous surveyors who carried out these researches in various quarters of the globe—men whose names have been often mentioned in our volumes, and some of whom have obtained our highest honours—I have no hesitation in affirming that the master mind of Beaufort, which directed such noble efforts during a quarter of a century, did more for the advancement of maritime geography than was effected in the same time by all the surveyors of other European countries united. Nor was it seamen only—but all men of science, as well as every traveller and geographical explorer of unknown lands, whether native or foreign, who always obtained from him the clearest information, which was communicated in the heartiest manner. Indefatigable in the transaction of business, and not trusting to others what he could do with his own compass and pen, there was no public servant who more uprightly served his Sovereign and his country.

By his official labours he brought up maritime surveying to the state of improvement it now exhibits. Beginning with our own shores at a period when all knowledge respecting them was fearfully inaccurate, he originated that series of works which, as I have

already mentioned, he extended to nearly all the coasts of the world. Nay, he also issued so long ago as 1831 those instructions for deep sea soundings which Lieutenant Maury and others have since matured. Such great plans were, indeed, but commensurate with Britain's naval supremacy, and were really called for. Although much was done, still much more might and would have been done had Beaufort had his way ; but parsimony (such, indeed, as seems to be periodically and, as it were, spasmodically exerted by economists in depressing our naval and military establishments) threw back, for a quarter of a century, those results which our lamented member would speedily have obtained, to the great advantage of the nation and the saving of innumerable lives from shipwreck !

Whilst presiding over geographers, let me further remind you of the obligations of the nation to Francis Beaufort independently of his intensely hard official work. For, he was the individual of that Society which, under the guidance of Lord Brougham, gave such an impetus to the Diffusion of Useful Knowledge, and who laboured perseveringly and successfully for many years in editing and bringing out the collection of maps issued by that meritorious body. From the allusion to a Society in which I played a much more humble part, I hope to be excused if I say a few words respecting my own connexion with the late Hydrographer, as they may serve to shadow forth to those who knew him not, other traits of his noble character.

First making his acquaintance at the house of the illustrious Wollaston, I could not fail to observe in both these great men the same truthful singleness of purpose and the same inflexible resolution to carry out their well-matured designs for the advancement of science. Always admiring and cultivating the friendship of Francis Beaufort, it has been my pleasing duty, whether as your President or one of your Council, to have had much intercourse with him, and also to have had the honour of being associated with him in drawing up some instructions for the exploration of distant realms. On no one, however, of those occasions have I seen the kindest feelings of his breast so much roused, as during the recent efforts of this Society to animate the country and the Government to make a last search for Franklin and his missing ships. In all the great tentative efforts which Britain made during a series of years to discover the traces of that lamented navigator, Francis Beaufort was indeed ever (as he is represented in a well-known engraving)

the centre of that group of distinguished explorers and friends of the missing navigators—the animus from which proceeded the devices and arrangements of the Arctic expeditions.

As he never abandoned hope, so long as his mind's eye could discern in the distant perspective a single plank of the *Erebus* and *Terror*, nor shrunk from endeavours, so long as there was the remotest chance of saving the life of one of the fine young officers and men of Franklin's ships, I recur with delight to the scene when, in his 83rd year and reclined upon his couch, his face beamed with joyous hope when he put his hand to that memorial which I had the honour to present to Her Majesty's Government, praying for a last and limited search after the relics of the missing expedition. Nor, when that appeal, which sought to send a Collinson once more to the area which he had so nearly approached, and from which he so skilfully brought back his ship, had unfortunately failed, can we forget with what renewed fervour the retired and venerable Hydrographer united with us in promoting and sustaining the efforts of the magnanimous woman who alone undertook the task of sending out the expedition under M'Clintock, to the issue of which we all now look with such deep anxiety.

In short, it was a genuine and innate kindness of soul, united with the highest moral worth and the brightest intellect, as displayed throughout his long life, that attached every friend to him with an abiding regard, and obtained for Francis Beaufort a reputation which will endure as long as the English nation shall honour one of her truest worthies.

Sir Francis Beaufort attained the rank of Rear-Admiral in the year 1846, and in 1848 was decorated with a Commandership of the Bath. He had also the honour to be a Corresponding Member of the Institute of France, a D.C.L. of Oxford, and an honorary member of various foreign Societies. He had long been a distinguished Fellow of the Royal Society; was one of the founders of this Society, and I need scarcely remind you that he was ever the most zealous and enlightened supporter of our onward progress.

In the Obituary of last year I spoke to you of the merits of one of the brightest lights of British geological science in the late Dean Buckland, and now it is my sad duty to advert to the other kindred spirit of the University of Oxford, the Rev. William CONYBEARE, Dean of Llandaff, who, when I entered upon the pursuits of geology, was one of my respected leaders, and to whom I became sincerely attached. The son of the rector of Bishopsgate, and the grandson

of a dean of Christchurch, William Conybeare was born in 1787, and educated first at Westminster; his earlier acquirements being matured at Oxford, where he was distinguished as a scholar. He no sooner quitted the University of Oxford, in which he had taken high honours at the same time as the late Sir Robert Peel and the present Archbishop of Dublin, than he spent the leisure hours of a country clergyman in recording the natural phenomena of the subsoil and its products. Becoming a member of the Geological Society, he gave to that body his first Memoir in 1814, and eventually prepared, in conjunction with Mr. W. Phillips, 'The Geology of England and Wales' (1822). By that excellent work, of which his associate undertook the mineralogical portion only, Mr. Conybeare fairly established himself as one of those who, following in the track opened out by William Smith, of identifying strata by their fossils, were the founders of that British geology which has sent its types and nomenclature through the world.

Any one who may refer to this volume will see how invariably the author adopts the true method of geological arrangement, by beginning the description of each natural deposit in the crust of the globe by a clear delineation of its geographical outlines and the character of the country. Even in his 'Introduction' we find comprehensive views of the structure of the earth enunciated with the enthusiasm of a real lover of geographical discovery, when he thus incites the geologist to push on fearlessly in the search after truth—"how little comparative curiosity should we feel concerning the course of the Niger or the North Coast of America could they be as easily examined as the Thames and the Channel!" In every chapter of the same work we meet with sketches of the surface and external characters of each tract, as well as the heights of the hills, and the phenomena of wells and springs (all of them integral geographical data), duly interwoven with an account of the chemical and mineral qualities of the subsoil, the imbedded fossils, and the erosion and fractures to which the strata had been subjected. Again, the long, coloured section, from the Land's End on the west to the German Ocean on the east, is in itself a fine sample of the generalising powers of Conybeare; for although geology has made vast strides since the year 1822, many of the features of this remarkable picture of the then state of our knowledge are still as true as when the author sketched them with the bold hand of a master.

In the same year Mr. Conybeare also displayed his talents as a

naturalist and comparative anatomist, by his notice of a then unknown fossil reptile, which he showed to be a link between the ichthosaurus and the crocodile, and to which he assigned the name of plesiosaurus. This memoir, and another on the same subject in the succeeding year, created a most lively sensation among all naturalists, and winning the admiration of Cuvier, obtained for our deceased Associate the honourable post of correspondent of the Academy of Sciences. But I will not attempt to enlarge on these geological and palæontological triumphs, as my contemporary General Portlock has done ample justice to them in his recent Presidential Discourse, addressed to the Geological Society, in which he has successfully delineated the scientific merits of William Conybeare.

Retiring gradually from the toils of the geologist, and restricting himself to those clerical duties and theological readings which enabled him to obtain the dignity in the Church which he occupied for some years before his death, the last geological effort of Mr. Conybeare was his Report on the Progress of Geology, which, as a spectator more than an active workman, he gave to the British Association for the Advancement of Science, when they held their first meeting at Oxford in 1832.

The masterly manner in which he then grouped the various data, and recorded the advances made in the years which had elapsed since he was himself a contributor to the science, produced a deep feeling of gratitude on my part; for he encouraged me by the assurance that the distinction which had then been recently conferred upon me by placing me in the chair of the Geological Society had been worthily vindicated by my labours in the North of Scotland at one end of the European scale, and in the Alps at the other, as exhibited in a great section across Europe which he had prepared.

This approval of so eminent a man was indeed a main cause in leading me to make other exertions, which up to this day have not been discontinued; and whatever little merit they possess, I feel that they have been to a great degree elicited, first by the works and example, and then by the advice and approbation, of William Conybeare. For, even in succeeding years, when retired in his deanery at Llandaff, he again incited me, after my journeys in Russia, at once to publish a geological map of Europe; saying that the area which, in conjunction with my friends, I had laid down in that vast empire would enable any compiler to deprive myself

and associates of the honour which justly belonged to us, of producing the first Geological Map of Europe arranged on the principles of British classification.*

Long as I have been connected with the pursuits of science, I never yet met with any one of its cultivators who had a more ingenuous love of truth than Dean Conybeare; and I can safely affirm that he was universally beloved in the Geological Society, in which he bore so conspicuous a part. In addition to his scientific acquirements, the Dean of Llandaff was one of the best Greek scholars of his day, and was as deeply read in classics as in that ancient literature of the Church, in the study of which he passed many of the latter days of his life—happy in seeing that the true learning, high principles, and right feeling which he had implanted in the minds and hearts of his sons (of whom, alas! he had lost two) were raising them in the walks of life they had respectively embraced, to positions in which they are doing all honour to the name of Conybeare.

Rear-Admiral Sir John Ross, K.T., C.B., who was born in 1777 at Balsaroch, Wigtonshire, entered the Royal Navy in 1786, served in the Mediterranean until 1789, and afterwards in the Channel. He was in the expedition to Holland, and also under Sir James Saumarez. In 1808 Lieut. Ross acted as Captain of the Swedish fleet, and was made a Commander in 1812. During his war services in three different actions he was wounded thirteen times.

In 1817 the Admiralty having resolved to attempt to solve the question of the North-West Passage, Commander Ross was appointed to the *Alexander*, and Lieut. W. E. Parry to the *Isabella*; they sailed in 1818, and having made the circuit of Baffin Bay, returned to England the same season, when Ross was promoted to the rank of Captain. In 1829, aided by the munificence of Mr. Felix Booth, he purchased the *Victory*, a steam-vessel of 150 tons, to follow up the discoveries already made in the direction of Barrow Strait.

The *Victory* sailed from England in 1829, Commander (now Sir) James Clark Ross being second in command. Having visited the

* As soon as the geological map of Russia was published (1845), embracing nearly two-thirds of Europe, and that my colleague de Verneuil had produced a map of Spain (the only then remaining *terra incognita geologorum* of Europe), it was evident that a general map might then be constructed chiefly by compilation. I delayed so long in profiting by the sound advice of Dean Conybeare, that when my map of Europe appeared in 1854, it was soon followed by the large and brilliantly coloured map of Dumont of Liège. The cartographer will at once see, by comparing them, how vast a portion of the work of my eminent Belgian contemporary has been derived from the map of Russia.

wreck of the *Fury*, in Regent Inlet, the *Victory* reached Cape Garry in August, 1829, and thence proceeded South-West to lat. 70° North, and long. 92° West, when an impenetrable barrier of ice finally compelled her to winter in Felix Harbour. During 1830 Captain Ross could only move the *Victory* about four miles, and in the following year merely gained a port fourteen miles farther, now named Victoria Harbour, where, after another winter, he abandoned his vessel, in May 1832. Exposed to much danger, the party made their way northwards to about lat. 74° North, and long. 90° West, but want of provisions and the approach of winter obliged them to return to Fury Beach, which they reached on the 7th of October, about three years after the time they passed it on their outward voyage. Here they lived in a hut 32 feet long, made from the wreck of the *Fury*, and passed another dreary winter amidst privation and considerable suffering.

On July 8th, 1833, Captain Ross and his party made a last effort to escape. Dragging the sick to the boats, they embarked, and crossing the inlet to Cape York, reached a point East of Navy Board Inlet, where they fortunately got on board the whaler *Isabella*, formerly commanded by the gallant Captain himself, and in October they arrived in England, to the joy of us geographers, who, failing to induce the Admiralty to send out a searching vessel, had commenced a subscription for the purpose.

In the same year 1833 Capt. Ross deservedly obtained the Gold Medal of this Society "for discovery in the Arctic Regions of America," and the Gold Medal of the Geographical Society of Paris, together with various foreign orders, including that of the Swedish Polar Star; and in December, 1834, he received the honour of Knighthood together with that of C.B.; his patron, Mr. Felix Booth, being raised to a Baronetcy by King William IV., who entertained a personal regard for our deceased Associate. A committee of the House of Commons assisted by scientific men appointed to investigate the results of this expedition declared that they saw no reason to doubt that Captain Ross nearly approached, and that Commander James Ross had actually reached, the Magnetic Pole.

Sir John Ross was the author, among other works, of Letters to Young Sea Officers, Memoirs and Correspondence of Admiral Lord de Saumarez, and a Treatise on Navigation by Steam: he also translated and edited a Memoir of Admiral de Krusenstern, which was dedicated by permission to this Society.

This gallant officer and persevering explorer was promoted to

the rank of Rear-Admiral in July, 1851, and died in November, 1856.

By the death of the Rev. Sir Henry DUKINFELD, Bart., I lose one of my oldest and most steadfast friends. He was the third son of Sir Nathaniel Dukinfield, Bart., of Stanlake, Berks.

Educated at Eton and Oxford, and there forming intimacies which lasted through life, Henry Dukinfield had been for many years a zealous and devoted provincial clergyman before he succeeded to the title by the death of his elder brother Sir Lloyd. After he had performed his duty in an exemplary manner for 18 years as Vicar of St. Giles's, Reading, that eminent scholar the late Dr. Blomfield, Bishop of London, selected Sir H. Dukinfield to assume the important duties of Vicar of St. Martin's in the Fields, most of the parishioners of which were, at that time, in avowed hostility to their pastor. And never were duties more earnestly, sedulously, and honourably performed. His influence throughout that populous parish became so felt from the peer to the humblest artisan, and he so laboured in calming rivalries and disputes in the vestry, that when from the state of his health he found himself compelled to retire from the active scene, he received the heartiest thanks from all his flock, as well as from numerous Dissenters; with the expression of their deep regret at being deprived of his aid and counsel.

Having long thought that habits of cleanliness were essential to the raising of the humbler classes in their moral condition and well being, he worked out and completed a favourite scheme at which he had been labouring for some years, of establishing cheap public baths and wash-houses; and though necessarily excluded by his profession from a seat in Parliament, the Act which sanctioned these highly useful adjuncts to the comfort of the people is, and will always be, known as *Sir Henry Dukinfield's Act*.

After retiring from St. Martin's, and during his latter years, far from being contented to live a life of idleness, he never failed (and, as I can testify, often when unwell) to assist his overworked brethren in the Church. He also took the liveliest interest in establishing the New Hospital for Sick Children, and so supported it for six years by personal superintendence, preaching sermons, and procuring subscriptions in addition to his own, that as chairman of the Committee he was justly considered the mainstay of that useful establishment.

With these legacies to his country, Sir Henry Dukinfield left behind him such a character for probity, kindness of heart, and un-

tiring zeal in the promotion of every philanthropic object, united with the manners of a high bred gentleman and the acquirements of a scholar, that he was justly regarded as a pattern of a Christian whose deeds were continual proofs of the sincerity of his faith. He married the widow of the distinguished Peninsular officer Lieutenant-General Chowne, who, as well as his only sister Mrs. Prichard Smith, survive to mourn his loss. As he left no male heir, the ancient baronetcy conferred by Charles II. on the son of the "gallant and honest" Colonel Dukinfield of Dukinfield, Cheshire, so distinguished in the Civil Wars, has become extinct.

Sir George DUCKETT, Bart., M.A., F.R.S., who was one of the early Members of this Society, having joined it at its commencement, in 1830, died on the 15th of June last, at the age of 78. He was the son of Sir George Jackson, Bart., formerly Secretary to the Admiralty and Judge Advocate, and many years M.P. for Colchester and Weymouth; the name of Duckett having been assumed after his maternal grandfather. He represented Lymington from 1807 to 1812, was a Deputy Lieutenant for Herts, and at one time was Colonel of the West Essex Militia.

Sir George was a zealous supporter of science, a profound classical scholar, and a good linguist; having translated various Scriptural works from the German. In private life he possessed many amiable and excellent qualities, and his death was deeply deplored by all those who knew his worth.

Charles William, Earl FITZWILLIAM, K.G., F.R.S., another of the early members of the Society, died on the 14th October last, at the age of 71. The only son of William, fourth Earl Fitzwilliam, he was educated at Trinity College, Cambridge, and as Lord Milton represented the county of York in the House of Commons in seven successive Parliaments between the years 1807 and 1833, and succeeded to the Earldom on his father's death that same year. Earl Fitzwilliam was essentially manly and honest as a public man, and among the many traits of benevolence by which his conduct was characterised, no one was more conspicuous than his early and unceasing endeavours to bring about an abrogation of the corn laws. Blessed with a deep sense of religion, and largely exercising the gifts of charity, the liberality of this public spirited and upright nobleman extended itself to science both in a pecuniary form and in rendering personal assistance.

Nor had any one a juster appreciation of the public value of scientific pursuits. As far back as 1831, when few senators had

given encouragement to science, and when I was one of the few men who assembled at York to support the scheme suggested by Sir D. Brewster, and worked into an efficient system by my enlightened friend William Vernon Harcourt, Lord Fitzwilliam, in describing the benefits to be expected from the institution of the British Association for the Advancement of Science, over the first meeting of which he presided, thus spoke: "I hope that the meetings thus auspiciously begun, will rapidly advance to still greater importance, and become the source of incalculable advantage to science hereafter. In addition to other more direct benefits, I hope they will be the means of impressing on the Government of this country the conviction, that the love of scientific pursuits and the means of pursuing them are not confined to the metropolis; and I hope that when the Government is fully impressed with the knowledge of the great desire entertained to promote science in every part of the empire, they will see the necessity of affording it due encouragement, and of giving every proper stimulus to its advancement."

The death of this good and patriotic nobleman was as deeply deplored by all those persons of the upper and middle classes who partook of his widely-spread hospitality, as by the masses of the people, of whom he was the ardent friend and protector.

The life of Lieut. J. Baptiste HOLMAN, well known under the name of the "Blind Traveller," was a special illustration of the pursuit of knowledge under apparently insurmountable difficulties. At the age of twenty-five he was obliged to leave the naval service, a profession of which his active mind and singular aptitude for the acquisition of practical information would have rendered him a distinguished ornament. The illness which ended in the total deprivation of sight resulted from the anxious discharge of his professional duties. At first some hope was entertained that his sight would be preserved, but when at length it became certain that there was no prospect of recovering the power of vision, his resolution to adapt himself to these distressing circumstances showed at once that mental courage which was afterwards so remarkably developed. The appointment as a Naval Knight of Windsor seemed to afford an easy retreat from turmoil to a person in his circumstances. But the seclusion of Travers College was ill-suited for his anxious mind; and his bodily health also suffering from that routine life, he obtained permission to travel. His first journey, made in the years 1819, 1820, and 1821, was through France, Italy, Switzerland, and parts of Germany bordering on the Rhine, Holland, and the

Netherlands. The narrative of these travels went through four editions.

In his next journeys he traversed Russia, Siberia, Poland, Austria, Saxony, Prussia, and Hanover, during the years 1822, 1823, and 1824. While passing through the Russian territories he was suspected to be a spy, and was conducted as a state prisoner from the interior of Siberia to the frontier; having penetrated during that journey to 1000 miles beyond Tobolsk. Nor is it the least wonderful feature in these enterprises that, although when at home he was always attended by a servant on whose arm he leaned, he never on any occasion took a servant abroad, always travelling alone, and trusting to his own sagacity, and the sympathy which never failed him wherever he went, for safe conduct through all emergencies and perils. His Russian travels, curious in their details and full of adventure, ran through three editions.

In 1834 he published his principal work, recording a still wider field of research, entitled a 'Voyage Round the World,' in four volumes. This publication was dedicated to Queen Victoria, through whose kindness he had previously obtained a dispensation from residence at Windsor; an act of gracious protection which he spoke of to the last hour of his life in terms of deep gratitude. The 'Voyage Round the World' may be considered his most elaborate production. It embraced the Journals of a vast route, including Africa, Asia, Australasia, and America, as explored between the years 1827 and 1832; and is, in reference to the mass of information it contains, and the peculiar situation of the author, an extraordinary literary monument of energy and perseverance.

Although Lieut. Holman had now twice circumnavigated the globe, visited most countries, and made himself familiar with their geography, internal industry, and external relations, the passion for exploring distant scenes and gathering fresh information survived even the physical strength necessary to its safe indulgence. Of him, indeed, it may be said, that his eager soul subjected its feeble tenement to the severest tests. Few men of the strongest constitutions could have endured the fatigues which the Blind Traveller voluntarily undertook; and at an age when most men seek repose, he was still found in motion, on the Danube or near Constantinople; attending to the processes of wine making in Portugal, or visiting the scene of some Scriptural tradition at Jerusalem. His last journeys were made through Spain and Portugal, Wallachia, Moldavia, and Montenegro, Syria and Turkey, and his final employment was the

preparation for the press of his later journals, which experience and matured observation had rendered more valuable than any of his former records of travel. The whole of these, and a large mass of miscellaneous papers, are in the hands of his friends, and it is to be hoped they will be given to the public, accompanied by an adequate biography of this remarkable man. The character of Lieut. Holman was eminently calculated to command respect and conciliate attachment. Patient, gentle, and firm, he was beloved by his friends, and won the confidence and regard of the numerous and varied circles by which he was at different times surrounded.

Mr. Joseph Ravenscroft ELSEY, who died in January last in the West Indies at the early age of twenty-four, had already distinguished himself as a naturalist and explorer, as recorded in our Journal.

Educated at the London University and College of Chemistry, and passing at the Royal College of Surgeons, he was appointed as surgeon and naturalist to the North Australian Expedition, under our Medallist, Mr. A. C. Gregory. The zealous and efficient manner in which he fulfilled the arduous duties attached to his post, during twenty months of toilsome travel, won for him the high praises of his commander, and the friendship and admiration of his associates. On his return to England he communicated a paper to this Society on North Australia, and was soon after offered the appointment of Government surgeon at Seychelles, which he however declined, preferring to go to the West Indies, with a view to the collection of natural history specimens. He had scarcely been six weeks at his post when he was attacked with what at first appeared a slight illness, but which soon terminated fatally; and there is too much reason to believe that his untimely end was attributable in great measure to over-fatigue and privation when engaged in the North Australian Expedition.

The late Earl SPENCER, K.G., was born at the Admiralty, Whitehall, his father having for many years presided over that department of the Government. He adopted the Navy as his profession, entering that service in 1811, a few months before he attained his fourteenth year. In September, 1825, he was appointed to the command of the *Talbot*, 28. While in that ship he served in the Mediterranean, under the late Admiral Sir Edward Codrington, in which he fought with distinction at the battle of Navarino, was present at the capitulation of Patras, and assisted at the reduction of the Morea Castle. For his conduct at the battle of Navarino the

noble Earl received the honour of c.b. In the latter years of his life he served as Lord High Steward of Her Majesty's Household, and was made a Knight of the Garter. Feeling that his health was rapidly giving way, he retired from office, and shortly after, on the 27th December, 1857, he expired, to the regret of his Sovereign and his numerous friends.

William Wilberforce BIRD, who was born in 1784, was the eldest son of W. Wilberforce Bird, of the Spring, Kenilworth, and Member for Coventry. In his boyhood he was at school at Warwick, but was sent to complete his education at Geneva. In 1802 he was nominated a member of the East India Civil Service, and went to Calcutta in 1803. After passing through the College of Fort William with considerable distinction, he was stationed at Benares, where he was early placed in situations of singular difficulty and importance. On one occasion, in the year 1809, a religious disturbance broke out, attended with great destruction of life and property, and it became necessary to call out the troops, whom he personally conducted into the heart of the city, and was enabled to disarm and disperse the infuriated people, and restore tranquillity. On another occasion an insurrection, in resistance of the introduction of the house-tax, which threatened very alarming consequences, was put down through the exertions of Mr. Bird; the multitudes being dispersed without the loss of a single life.

For these services Mr. Bird received the highest approbation of the Government for "the prudence, firmness, zeal, activity, and judgment which had marked all his proceedings." After this time, Mr. Bird was selected for other important situations, where peculiar fitness was required; and having been successively placed in the highest offices, both judicial and financial, was at length appointed a member of the Supreme Council of India, of which, in the absence of the Governor-General in the North-West Provinces, he became the President, and was four times nominated Deputy-Governor of Bengal, with the duties of which office he was entrusted during the whole period of Lord Ellenborough's administration. When that nobleman was recalled, Mr. Bird succeeded him as Governor-General of India until the arrival of Sir Henry (the late Lord) Hardinge, whose first act was to re-appoint him Deputy-Governor of Bengal. Mr. Wilberforce Bird took a prominent part in all the great questions of the time, and was particularly instrumental in the abolition of suttee, the suppression of

slavery, the discontinuance of state lotteries, the extension of Native education, and the more general employment of well-qualified Natives in the administration of public affairs. In 1844, having been in the service of the East India Company forty-one years, he retired, and returned to England. On his departure from Calcutta, addresses were presented to him by the European and Native inhabitants, expressive of their sentiments of respect and esteem for his character and conduct, both as a public officer and a private gentleman. He passed his remaining days in the privacy of domestic life, beloved by all his friends, and particularly by his associates of the old Raleigh, now the Geographical, Club. He died in London, after a few hours' illness, on the 1st June, 1857, aged 73.

The Rev. Dr. SCORESBY.—Although it is not my bounden duty to offer to you sketches of the lives of our countrymen who have not been members of our body, yet when a very remarkable explorer, voyager, or geographer, who has not joined us, is taken from this world, I follow the practice adopted some years ago of attempting to bring the striking points of his character to your mind's eye. A man eminently entitled to be thus singled out was the late Dr. SCORESBY, who, at the early age of ten years, commenced his career as a seaman under the auspices of his father, one of the most successful captains of the port of Whitby in the Northern whale fishery. Thus early inured to the hardships and perils of the Arctic seas, his mind was developed by the employment of the winter months in pursuing a course of study at the University of Edinburgh, where his assiduity and ability gained him the friendship of the professors, and laid the foundation of that knowledge which enabled him subsequently to offer in so admirable and clear a manner an account of the Arctic regions.

As chief mate of his father's ship, the *Resolution*, he had the honour of navigating to the highest northern latitude then attained by any vessel, viz. $81^{\circ} 30'$; and though Sir E. Parry, in his celebrated boat expedition during his fourth voyage in 1827, arrived at $82^{\circ} 45'$, the distinction of being second in the approach to the Pole yet remains with Scoresby and his father.

The account of the Arctic regions, being the result of 17 years' experience in those seas, appeared in 1820, in two volumes; and besides a vast amount of statistical information relative to the whale fishery, then the most important nursery for our seamen, this work contains so great a mass of scientific observation that it is still a text-book of nautical science.

In 1822 he succeeded in reaching the east coast of Greenland, which, by his indefatigable labours, was laid down on charts from the 70th to the 75th degree of latitude, and, taking in the bays and fiords, a coast line of 800 miles was defined correctly, and errors of previous charts, amounting to no less than 7° of longitude, corrected. An account of this remarkable voyage (dedicated by permission to King William the Fourth) was published the following year; and in a copious appendix, the pages devoted to mineralogy, botany, zoology, and meteorology, evince to what great profit the author had studied at Edinburgh.

In the course of a visit to the island of Jan Mayen, Scoresby detected one of the most remarkable proofs of the effect of the equatorial current. He found on the shores of that singular island (recently visited by Lord Dufferin) pieces of drift wood bored by a ptenus or pholas, neither of which animals ever pierce wood in Arctic countries, and hence he concluded that the worm-eaten drifted fragment had been borne by currents from a transpolar region. The notion of a constantly open polar sea Dr. Scoresby always believed to be chimerical.

He was the first also to attempt observations on the electricity of the atmosphere in high northern latitudes, and his experiments made with an insulated conductor eight feet above the head of the main-top-gallant mast, connected by a wire with a copper ball, attached by a silken cord to the deck, are still regarded with interest for their novelty and ingenuity.

This collection of scientific data was never permitted to interfere with the main objects of the voyage, in the pursuit of which he was most successful, and, notwithstanding a resolute determination, that the sanctity of the Sabbath should never be violated by the pursuit of the whale, his ship usually returned the fullest of the season. Some idea of his constant zeal may be found in the expression which he uses, that, when he went into the ice, he considered it was his own watch on deck until extricated at the close of the season.

Abandoning nautical pursuits in the year 1823, Mr. Scoresby gave a fresh and remarkable proof of his unbounded energy and great ability by mastering the difficulties attendant upon the adoption of the career of a divine. Setting to work with the assiduity of youth, he graduated at Queen's College, Cambridge, as B.D., in 1834, and was inducted to that Church of England of which he became a distinguished ornament. In short, he devoted many years of his life

to the arduous duties of chaplain among seamen, whose religious welfare he most zealously promoted; his sermons, while they breathed the true spirit of Christianity, being strengthened by a tone of philosophical reflection which imparted to them much dignity and freshness.

In the progress of Arctic exploration Scoresby continued to take the deepest interest. Although he had thought, from the first, that the attempts to find a North-West passage to the China Seas would prove to be unprofitable for political or commercial objects, he considered that the scientific results justified all the risk and expense of such expeditions; maintaining that, even in regard to financial returns to the nation, the establishment of the Davis Strait fishery and of the trade of the Hudson Bay Company had compensated for the expenditure of public money in the early voyages of discovery.

The scientific career of Dr. Scoresby in the latter years of his life is well known. He became a Fellow of the Royal Society in 1824, and subsequently was elected a Correspondent of the Section of Geography and Navigation of the French Academy of Sciences. The Edinburgh Philosophical Journal and various scientific periodicals were enriched by occasional contributions from his pen on a variety of subjects of natural history and meteorology. To the observations of magnetical phenomena he had long devoted close attention, and his investigations, published at intervals from 1839 to 1843, and the concluding volume in 1848, contain a vast amount of valuable materials for sound induction. His reports to the British Association, at the meetings of which body he was a frequent and welcome attendant, and his numerous observations on the influence of the iron of vessels on the compass, were connected with inquiries of the utmost practical importance to navigation. It was in prosecuting these researches, and with a view to determine various questions of magnetic science, that Dr. Scoresby undertook a voyage to Australia, from which he returned last year, with his constitution much enfeebled by the arduous labours he had undergone.

Of this good man we may truly affirm that his name will ever be remembered with honour among those who by their character and services have sustained the reputation and extended the influence of the British name by the peaceful triumphs of science and philanthropy.

Dr. Baron von REDEN was born in the beginning of the present century, in the kingdom of Hanover, and was well known for his good statistical and geographical works on Germany, Austria, and

Russia. He was chief director of the Statistical Bureau in Vienna, and possessed a considerable private collection of valuable ancient and modern geographical maps, was a Vice-President of the recently-formed Imperial Geographical Society of Vienna, and died unexpectedly a few months since.

At the last Anniversary, I laid before you a brief sketch of the discoveries of the ardent young explorer and good astronomical observer VOGEL, and reported the rumours of his death, but hopefully threw doubts upon their accuracy. Alas! they have proved too true; and since then the assassination of his faithful assistant Maguire, who was bringing home many geographical records, has cast a sad gloom over the exploration of Central Africa, and teaches us how grateful we ought to be for the escape of even the living traveller, Barth, who is now giving us so much information respecting those turbulent tribes.

The death of Vogel appears to be placed beyond a doubt by the account of the envoy of the King of Darfur, who arrived last autumn on an amicable mission to the Viceroy of Egypt. He relates the rumours which had reached him before he left Darfur, and repeats their details with minuteness. Much of his account refers to the proceedings of Dr. Vogel's colleagues; and as we know that what relates to Barth is accurate, there appear to be no grounds for doubting the truthfulness of the remainder, especially as the place where Vogel is said to have been executed by the order of the barbarous King of Wadai is at no great distance from Darfur.

Edward Vogel was the eldest son of Professor C. Vogel, Director of the Public School in Leipsic, where he, at an early age, exhibited a strong predilection for astronomy, there being a good observatory in that city. He afterwards completed his studies under the celebrated Encke at Berlin. Concluding his academical training, he came to England, I believe, in 1851, and was employed in the observatory of Mr. Bishop until he was sought out to proceed to Africa early in 1853, and join Drs. Barth and Overweg.

On the eve of his departure, when he was full of ardour and hope, I made his acquaintance at the house of his patron the enlightened Prussian Minister, Chevalier Bunsen, when his ingenuous manners, intelligent conversation, and knowledge of the natural history sciences, in addition to sound astronomical acquirements, led me to conclude that he was admirably qualified to carry out his mission, particularly in determining the geographical position of many places in Africa. Alas! that he is not only taken from us,

but that with him and poor Maguire we lose a great portion of the results of his arduous explorations and accurate observations.

M. von Neimen, a young German gentleman of good family, who went to Egypt solely with the noble object of penetrating to Darfur and Wadai, there to ascertain the fate of Vogel, I regret to say, died of a lock-jaw at Cairo.

The fate of the faithful and intelligent Corporal Maguire has been already narrated to you in our Proceedings. In his last moments he exhibited the same unflinching tenacity and bravery which had marked his conduct throughout. Appalled by no sickness and intimidated by no foe, this fine specimen of a British soldier killed several of his murderous assailants before he lost his own life.

GEOGRAPHICAL PROGRESS.

Britain — Admiralty Surveys. — Following the plan of my last year's Address, I begin with the account of the Maritime Surveys of Britain, for the substance of which I am indebted to my eminent friend Captain Washington.

The Coast Surveys in course of execution under the orders of the Admiralty both at home and abroad have made steady progress during the past year. They are conducted by twenty different surveying parties, one-half of which are employed on portions of the United Kingdom, the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island, also in the Mediterranean, Coast of China, and Red Sea.

British Isles. — The Coast Survey of the United Kingdom has reached a point at which we can confidently predict that a very few more seasons will place the public, and all who take an interest in geography, in possession of a complete representation of the British Isles, not only as their shores, islets, and rocks rise above the level of high water, but also as the whole group reposes upon a bed circumscribed by a boundary line of 100 fathoms in depth.

The study of the configuration of that line is instructive. It shows that the group, although apparently broken up into three large, and countless small, islands, is physically connected on the south-east, through Belgium and Holland, with the continent of

Europe, while it is separated from Norway and Sweden by a gulf or fiord some hundred fathoms in depth. Probably it may not be generally known that some of the deep wells in London and Sheerness draw their fresh water from a stratum which lies fully 300 feet below the level of the bottom of any portion of the North Sea that intervenes between this island and the coasts of Belgium, Holland, or Denmark. The physical geographer will therefore find, if he examines them, that nautical charts teach something more than the mere depth sufficient for the wants of navigation. This undoubtedly is their first and main use; but in the course of a rapid summary of their labours during the past year, I shall be enabled to show you that the Admiralty Surveyors have sounded hitherto unfathomed depths both in the North and South Atlantic, in the Indian Ocean, and in the Red Sea, and have brought up sufficient of the bottom to enable geologists to explain the structure of new continents, now forming at a depth of 2000 fathoms below the surface of the water.

England.—The re-examination of the river Thames, to which I referred last year, under Commanders Burstal and Cudlip, has been completed from Putney to Woolwich, and laid down upon the large scale Ordnance plans of 60 inches to a statute mile—a minute and careful survey, which will form a valuable standard for reference hereafter, when the labours of the Thames Conservancy Board shall have dredged a deep, uniform channel, navigable at low water up to the London Pool. The deepening of the bed of the river, consequent upon the removal of old London Bridge in the year 1832, has been striking, and holds out encouragement to reconstruct the old-fashioned bridges at Newcastle, Wexford, and Cork, which now act as dams in their respective rivers, as the Tyne, the Slaney, and the Lee.

On the east coast of England the chief topographical changes consist in the improvement of the entrances of the several tidal harbours. The channel of the Tees has been dredged and trained to a fair curve, which can hardly fail to deepen itself. A chart of Tees Bay, on the scale of 3 inches to a mile, has recently been published at the Admiralty. It includes Hartlepool and Redcar, and thus shows at one view all the sites that have been recommended in this immediate locality for a harbour of refuge—an imperative work that can no longer be delayed, when we look at the fearful loss of life from wreck that annually occurs on this coast. At the entrance of the Tyne large works are in progress, which we trust may do somewhat to improve the mouth of that important river, in

and out of which no fewer than 45,000 vessels pass yearly—a traffic only paralleled by that of the ports of London and Liverpool. At Blyth, too, much has been done to improve the entrance, and to guide the flood and ebb streams into one channel.

On the south coast of England the surveying party under Commander Cox and Messrs. Osborne and Davis are still engaged in the examination of the inner portions of Plymouth Sound, including Catwater and Hamoaze, as far as Keyham, in the course of which they have examined 27 miles of harbour coast-line, and sounded over 50 square miles. In Cornwall Captain Williams and Mr. Wells have surveyed 15 miles of the open coast from St. Germain's Beacon westward to the entrance of Fowey, with plans of the small harbours of Charlestown, Par, Polkerris, and Polperro, and sounded over 47 square miles. At the northern entrance of the Bristol Channel, Commander Alldridge and Mr. Hall have been employed on the rocky passage known as Jack Sound, where they have mapped 21 miles of open coast line, and sounded over 40 square miles, discovering many dangerous rocks hitherto not marked on our charts.

Farther north, on the West coast, Mr. E. K. Calver has sounded the new refuge harbour of Holyhead, which already has afforded shelter to 3500 vessels during the past year, and is daily more resorted to as it becomes known. He has also resounded the packet-harbour at Portpatrick, and has generally examined the coast and harbours between Bardsey Sound and Ardrossan, including the newly-formed harbour at Silloth, on the English side of the Solway Firth, and has shown that there exists a channel, having 15 feet at low water, for which the mariner, in case of need, may safely run his vessel at a time when the tidal harbours along this portion of the coast cannot be approached.

Scotland.—In Argyleshire Commanders Bedford and Creyke and Mr. Bouchier have been employed on the coasts of Mull, Iona, Ulva, and Loch Etive, with the numerous adjoining islets, in the course of which work they have surveyed 112 miles of sea-coast and loch, and sounded over 90 square miles. In the detailed statistics which Commander Bedford has furnished of the progress of this season's survey, he states that the soundings were obtained by one officer, Mr. Bouchier, and his boat's crew; and it may give some notion of the minuteness of the survey, when I mention that, in the space of 90 square miles, they took 13,000 casts of the lead, the greatest depth being 97 fathoms. The neces-

sarily slow progress of the survey of these intricate coasts will be better understood perhaps from this single fact than from any general description that I might give.

In Inverness-shire Commander Wood and Mr. Forbes have surveyed 15 miles of the open coast of the Isle of Skye, from Loch Eishart westward to Loch Breatal, including the Soay isles and the remarkable lochs Scavaig and Coir-uisk (so admirably described by Walter Scott), and sounded over 83 square miles, reaching six miles off shore, and into a depth of 140 fathoms; while Mr. Jeffery has examined 40 miles of coast between Malag and Ru Arisaig, including the shores of Loch na Gaul.

In the Hebrides Captain Otter in H. M. S. *Porcupine*, with her tender the *Seagull*, assisted by a good working staff, composed of Messrs. Dent, Stanton, Stanley, and Cramer, has examined the shores and islets of the Sound of Harris, comprising, with all their indentations, 155 miles of coast line, in addition to sounding over an area of 435 square miles. This is an important service rendered to hydrography, as with this chart and the accompanying sailing directions before him, the mariner may safely run for the passage between Harris and North Uist, which has hitherto been avoided by all who could possibly escape from it. The chart is in the engraver's hands, and will be issued to the public in the course of the summer. At the same time Lieut. Thomas and Mr. Clifton have surveyed the rocky estuary of East Loch Tarbert, in Harris, and completed a chart of that remarkable inlet of the sea.

In alluding to these and other charts of the coasts of Scotland, I have real pleasure, as one acquainted with the value of detailed land surveys, in expressing my admiration of the maps on the six-inch scale, exhibiting all the physical features, which Captain Otter, Commander Wood, and their associates have laid down for three miles inland. Such terrestrial coast surveys may enable geologists to come to accurate conclusions respecting the general structure of Scotland before the geographical details can be worked out on Ordnance maps representing the interior of the country, and which will probably not be published for many years to come, even under the vigilant superintendence of Colonel James.

In the Orkneys no new survey has taken place; but six plans of the most important anchorages, surveyed in the year 1850 by the late Commander Thomas, have been published by the Admiralty during the past year; they are Otterswick, Pierowall, Stromness, Deer Sound, Long Hope, and the approaches to Kirkwall, all on a

scale of three inches to a mile; with these charts, and guided by the lights, buoys, and beacons recently placed in these islands by the Commissioners of Northern Lights, the mariner may boldly run in case of need for the many sheltered anchorages which this group affords.

Ireland.—On the east coast of Ireland Messrs. Hoskyn, Aird, and Yule have completed the survey of Lough Carlingford, the coast adjacent, and the river up to the town of Newry, sounding over an area of 62 miles. In the course of this work a new deep-water channel, having 18 feet at low water, was discovered leading into the lough, which may materially aid in the execution of a plan which, it is understood, is shortly to be carried out, of rendering Carlingford Bay a harbour of refuge for the Irish Sea—an object greatly to be desired, and which might be effected at a trifling cost.

In Donegal, on the north coast, Captain Bedford, with Lieuts. Sidney and Horner, have mapped 50 miles of the shore line between Loughs Swilly and Foyle, including the remarkable promontory of Malin Head, and the Garvan and Innishtrahull group of isles, in the progress of which work 220 square miles have been sounded over, extending to 10 miles off shore. At the risk of being tedious, I must again be permitted to call attention to the statistics of this survey, during which more than 23,000 casts of the lead were taken, or on an average 35 casts to the square mile in deep water, and 625 casts to the square mile when within a depth of 10 fathoms. These are facts apparently trivial, but which all physical geographers, who care to have a *bonâ fide* representation of the submarine hills and valleys of our planet, will know how to appreciate. By permission of the Admiralty, the charts resulting from these surveys have been exhibited at our evening meetings, and have deservedly elicited your applause.

Those who are curious in such matters may like to know that the whole cost of such a survey to the country, including the soundings, when conducted in the most economical manner, is about 30*l.* per mile of coast line.

In Kerry, on the south-west coast, Commander Edye, with Messrs. Macdougall and W. B. Calver, have examined 26 miles of the exposed coast of that long, projecting peninsula which separates Tralee and Dingle bays, its extremity forming the westernmost point of the mainland of the British Isles. They have also mapped Smerwick Harbour. On this coast the chart of Kenmare river, the

work of the late Commander Church, has been published during the past year, and gives a graphic representation of that remarkable region, interesting both to the geologist and geographer.

The coast of Kerry has just now another and a deeper interest, as Valentia has been fixed upon as the Eastern or European terminus of the Atlantic Electric Telegraph cable, which it is proposed to submerge in the course of the next month, and on this occasion, we heartily trust, with complete success, as the first experiment afforded many useful hints which will now be taken advantage of. The preparatory line of soundings, to which I referred last year as about to be undertaken by Commander Dayman, was most successfully completed in H. M. S. *Cyclops*, which carried a line of deep-sea soundings across the Atlantic from Valentia to Newfoundland, the detailed account of which has been published and largely circulated, and therefore is probably familiar to many of my hearers. As I shall, in the sequel, treat of the natural history results of this survey, under the head of Physical Geography, I will only say that the shelf or bank on which the British Isles repose was found to extend to the westward as far as the meridian of 15° , or about 180 miles off shore, when it suddenly dropped to a depth of 500 to 1500 fathoms. From the foot of this submarine cliff the bed of the ocean held an undulating course, varying from 1500 to 2400 fathoms, which depth was reached in long. 26° W. From this point of greatest depth the bed of the ocean gradually rises until, in long. 50° W., it reaches the outskirts of the bank on which the island of Newfoundland rests; it is round to the north of this shoal that the telegraph cable is destined to pass into Bull Harbour, near the south-western angle of Trinity Bay. Fully appreciating the value of Commander Dayman's soundings, and experience as a pilot, the directors of the Company have made it a special request to the Admiralty that this officer, now in command of H. M. S. *Gorgon*, may be allowed to accompany and precede the U. S. ship *Niagara*, with the western portion of the cable (after the junction has been made in the mid-Atlantic); and pilot her to her destination. You will doubtless all join with me in heartily bidding them God speed.

Mediterranean.—Of foreign surveys the Mediterranean claims precedence, as its shores were the earliest seat of civilisation, and must interest alike the antiquarian, the scholar, and the geographer. Notwithstanding the classic works of Beaufort, Smyth, and their successors, we have yet only imperfect surveys and vague accounts of a large portion of this region. In last year's Address I had

occasion to make honourable mention of a survey of the Delta of the Danube in the Black Sea, by Lieut. Wilkinson, under the orders of Captain Spratt. This has now been completed for the Kilia branch as well as for the Sulina and the St. George; and the facts brought to light in the course of the survey of the advance of the alluvial delta in one part, and its washing away by the inroads of the sea in another, have been usefully turned to account by Captain Spratt, in his Report 'On the Comparative Condition of the Branches of the Danube,' as a warning to the engineers engaged in the improvement of that river to be careful how they place ponderous stone walls on so unstable a foundation. At the same time it is shown, that with simple guiding, and a free use of the dredging-machine, there is a fair probability of the Danube being so improved, that vessels of moderate draught of water may load their corn at Galatz, and convey it without transhipment to Western Europe in safety. The plans which I have mentioned, by Lieut. Wilkinson, will doubtless be in request at the approaching Paris Conferences on the subject of the Principalities, and will well repay the labour of those who consult them.

Following up his deep-sea soundings of last year to the eastward of Malta, Captain Spratt has made some experiments on the surface and submarine currents of the Sea of Marmora, in which he shows that the surface current gradually diminishes and vanishes at a depth of 40 fathoms, and that no counter current is found below; also that the density of the water is not perceptibly greater from that level to the depth of 1500 fathoms; from which depth he has brought up by his sounding-lead some beautiful specimens of minute, delicate shells of *Cleodora*, *Limacina*, *Spirialia*, *Atlanta*, &c.

The survey of the eastern half of the large island of ancient Crete, or Candia (the Kirit Adassi of the Turks), by Spratt, Mansell, and Wilkinson, has been published at the Admiralty during the past year, and for the first time we have an accurate representation of that fertile and beautiful island (with Mount Ida towering to a height of 7000 feet), which was formerly so populous and civilised that Homer * speaks of its hundred cities, *Κρήτη ἑκατομπολις*. In modern times, and we trust before the close of the present summer, this island is destined to form the connecting link between the lines of submarine telegraph that are to unite Constantinople and Alexandria.

* See notice of Crete, by the Right Hon. W. Gladstone, in his new work on the Odyssey.

On the coast of Egypt Commander Mansell, with Messrs. Brooker and F. Skead, his assistants, have mapped the shore from Alexandria to Damietta, with plans on a large scale of the Rosetta mouth and the Bay of Abukir; this completes the coast as far as El Arish, and forms a positive and important acquisition to our knowledge of the geography of these regions. I may here mention that Captain Spratt has recently drawn up a Memoir on the proposal for a Suez Canal, in which he disposes of the fallacious argument, that because the Delta of the Nile does not sensibly advance on the sea, therefore the river has ceased to bring down alluvium, by showing that the Delta has advanced to such a point that the stroke of the sea, arising from the prevalent winds, is sufficient to keep it in check, but that the detritus is still brought down and carried away to the eastward, and forms dunes and sandhills which, at Kas Burún, rise to a height of 270 feet above the level of the sea. The survey of the coast of Egypt having been finished, we trust that the time has arrived when the shores of Palestine and Syria will no longer be permitted to form the opprobrium of our maps, and that, in the middle of the nineteenth century, we shall at last ascertain the accurate geographical position of such ports and places as Tyre, Sidon, &c., the names of which are found in some of the earliest records of the human race.

South Africa.—In the Cape Colony Mr. Francis Skead has surveyed the entrance of the St. John River, or Umzivubu, on the south-east coast, and has begun a closer examination of Table Bay. But the further survey of the coast to the eastward is paralysed by the want of a land survey of the colony, notwithstanding that each year as it passes away proves more strongly than the last that this want bars the progress of the settlers, hinders the development of the revenues of the district, and is attended with loss to the colonial exchequer. No one knows this better than Mr. Maclear, the enlightened astronomer at the Cape Observatory, and every time he sends home a fresh sheet of the printed account of the remeasurement of Lacaille's arc of the meridian (which has now reached the 234th page) he expresses his regret at the want of foresight evinced in not going forward with this survey.

Red Sea.—The increasing demand for telegraphic communication with India has led to the despatch of a vessel to carry a line of soundings from Bab el Mandeb to Suez. Captain Pullen, R.N., of H. M. S. *Cyclops* (known to most of my hearers for his hardy boat expedition in the Arctic Sea from Point Barrow to the Mackenzie, in the

year 1849), was selected for this service. The ship being well fitted for deep sea sounding, a few deep casts were made in the Atlantic and in the Indian Ocean on the passage out. First the lead was dropped at the site of the *Devil* Rock, in the North Atlantic, which has been so often reported, and also at the *Hannah* Shoal, in $10^{\circ} 7' N.$ and $27^{\circ} 32' W.$, and no bottom found with 2000 fathoms of line: these two *vigias* then, as far as a radius of 50 miles each extends, are swept from our charts. In $4^{\circ} 16' N.$ and $28^{\circ} 42' W.$ bottom was got at 2100 fathoms. In $2^{\circ} 42' N.$ and $28^{\circ} 44' W.$ bottom was struck in 1080 fathoms; at 5 miles south of the Equator also 1080 fathoms; these two casts are respectively at 90 miles north and south of St. Paul's Isle. In $4^{\circ} 16' S.$ and $28^{\circ} 42' W.$ got bottom in 2100 fathoms; in $26^{\circ} 46' S.$ and $23^{\circ} 52' W.$ struck bottom in 2700 fathoms; this last sounding is important, as it is only 350 miles to the westward of a cast of 2426 fathoms, obtained by Captain Sir James Ross in the year 1839. In the Indian Ocean the casts obtained were 1400 and 1110 fathoms, near the supposed *Brunswick* and *Atalanta* Shoals, which do not exist; in $16\frac{1}{2}^{\circ} S.$ and $59^{\circ} E.$ got bottom with 1400 fathoms; in $5^{\circ} 30' S.$ and $61^{\circ} 40' E.$ bottom in 2254 fathoms, thus proving the non-existence of the *Rose*, *Galley*, *Swift*, and *Bridgewater* Shoals.

Ceylon.—Although no new surveys of this coast have recently been made, yet a valuable addition to the hydrography of this island arises from the publication at the Admiralty of two charts, on a scale of a quarter of an inch to the mile, extending from Colombo on the west, round the south coast, including the dangerous shoals named by the Portuguese the *Bassas*, and the east coast, comprising the rocks near Pigeon Island, off Trincomalee (where the *Ava* was recently wrecked), as far as Point Pedro. A new plan has also been compiled from various authorities of the harbour at Point de Galle. We do not know with whom it rests to make a complete survey of these coasts, but, whether it lie with H.M. Government or the East India Company, no time should be lost in setting it on foot, if we do not wish to hear of other losses in addition to that of the *Ava*, although it does not appear that that wreck was in any way the fault of the chart.

China.—In my last Anniversary Address I had the satisfaction of announcing to you that Captain Bate, R.N., the surveyor of Paláwan, was appointed to H.M.S. *Actæon*, for the examination of the coast of Tartary. Alas, how little do we know of the future! Hardly had he taken command of his ship, and prepared for his campaign, when

the assault on Canton was determined on. Foremost as usual at the post of danger, he volunteered for the hazardous task of selecting a site for the scaling-ladders of the storming party, and in doing so approached so near to the city walls that he was shot dead on the spot. Thus was lost to his country as zealous a surveyor, as gallant an officer, and as good a Christian as any in Her Majesty's service. He has left behind him in his works a monument more durable than brass. So long as the mariner's route to China lies along the coast of Paláwan, and that he can thread with safety that labyrinth of coral reefs that skirts its western shore, so long will the memory of this accomplished officer be held in esteem. In an unfinished letter to the Hydrographer to the Admiralty, found in his writing-desk after his death, Captain Bate says "he hopes soon to sail for the *Pratas*, at the south-eastern approach to the China Sea, to determine the best site for a light on that dangerous shoal, which has caused the wrecks of so many vessels." As the light on *Pedra Branca*, at the south-western entrance of the China Seas, is known by the name of HORSBURGH, whose Sailing Directory and Charts have long been the guide of the mariner in the East, so would it seem to be a fitting memorial to the gallant officer who has sacrificed his life in his country's cause, that the lighthouse, shortly to be erected on the *Pratas*, should be known by his name, and that the mariner, who, by a friendly beacon, is thus warned off that dangerous shoal, should be reminded of him whose last thought was for the sailor's benefit, and have cause to bless the name of THORNTON BATE.

Immediately after the capture of the city, our staff of surveyors under Lieutenant Bullock set to work, and have now completed a trigonometrical survey of Canton; and have finished what was formerly left undone of the chart of the Chu-Kiang, or River of Pearls, as far as Whampoa. They have also, under Mr. Frederick Kerr, made a track chart of the river to the west as far as Fatshan and Sam-shui.

Siam.—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards, Inskip, and Reed in the *Saracen* have again visited Bangkok, where, as before, they received every attention and assistance from the enlightened rulers of that country, the two Kings of Siam; they have completed a plan of the city and of the river Menam, which has been published at the Admiralty, and they have determined the position of most of the islands, as well as many of the headlands and capes on the

western, as well as on the eastern, shore of the gulf. A table of maritime positions, just printed at the Admiralty, and embodied in the latest edition of the chart of the gulf, will enable all map makers to correct the hitherto almost unknown outline of the coasts of that kingdom.

In *Australia*, a survey of Port Jackson has been made by the officers of H.M.S. *Herald*, and is in course of publication at the Admiralty; some additions also have been made to the approaches to Princess Royal Harbour. Here, and on Breaksea Island, lights have just been established as a guide to the anchorage for the Australian mail steamers, which at present all call at this port on their homeward voyage.

New Zealand.—Detailed coast charts of the entire circuit of this group of islands, the fruit of ten years' labour of Captains Stokes and Drury, with their zealous staff of assistants, on an uniform scale of 5 miles of longitude to an inch, or on an average scale of one mile to a quarter of an inch, 13 in number, are now engraved, as are also a complete series of the numerous ports and havens dotting the extensive sea-board.

Those singular arms of the sea, forming a network of harbours on the south shore of Cook Strait, one of them Queen Charlotte Sound, famous as the chief place of resort of the circumnavigator Cook, are being engraved on a scale commensurate with their nautical importance, and on their completion, by the close of the present year, it may be considered that the hydrographic features of New Zealand are fully delineated.

In *Vancouver Island* and in the Straits of Juan de Fuca, Rosario, and the Haro Channel, a survey is in progress under Captain Richards, of H.M.S. *Plumper*, ably seconded by his staff of assistants, Messrs. Mayne, Bull, Pender, and Bedwell; the Bay of Semiahmu has been examined, and the site of the recently discovered gold mines fixed at some 50 miles up the river Frazer. On the Oregon coast two charts, for which we are indebted to the U.S. Coast Survey of this region, from Diego Bay to Vancouver Island, have been published at the Admiralty; and in the Gulf of California, Captain Harvey, in H. M. S. *Havannah*, zealously assisted by Mr. Hull, Master R.N., has rectified the positions of various points of that little known coast, which have been inserted in the charts.

In the *River Plate* Lieut. Sidney, R.N., has completed a plan of Buenos Ayres and its roadstead, which has been published; while

the results of the reconnaissance by Capt. Page, of the U.S. navy, in his ascent of the Paraguay and Paraná, published in America, have been immediately re-engraved and published at the Admiralty, in connexion with the former labours of Captain Sullivan, for the benefit of merchants and others desirous to open a trade with that rising and fertile country. New charts of Bahia and Rio de Janeiro, in Brazil, on a sufficiently large scale, from surveys by various naval officers, have also been recently published.

The position of that dangerous coral reef *As Rocas*, lying off Pernambuco, has been redetermined by Commander Selwyn, in H.M.S. *Siren*, and found to be in lat. $3^{\circ} 51\frac{1}{2}'$ s. and long. $33^{\circ} 50'$ w., just 100 miles from the Island of Fernando Noronha, which agrees very nearly with the position assigned to this islet by Lieut. S. P. Lee, of the U.S. navy. A beacon, 33 feet high, painted black and white, has been erected on the western island; and some cocoa-nut trees, planted in 1856 by Capt. Parish, are growing.

The attention of the astronomical world is just now greatly attracted towards this portion of South America, inasmuch as the total eclipse of the sun of Sept. 7 will be visible in that country. The path of the shadow of the eclipse, about 30 miles in width, will reach the continent on the Pacific side, a little to the southward of Payta in the state of Equador, in about 5° south lat., and curving in a s.e. direction across the interior of the country, will quit the coast near Santos, in Brazil, in lat. 25° s. nearly. Perhaps the best position for seeing it will be from the summits of the coast range of the Andes, near Payta, shortly after sunrise on the morning of the 7th of September. It is with much gratification that I am enabled to add that the Admiralty, in the interests of science, have placed a steamer at Rio de Janeiro at the disposal of any *bonâ fide* astronomer who may be disposed to observe this rare phenomenon on the coast of Brazil. On the shores of the Pacific such aid is not necessary, as the regular mail steamer from Panama to Chile always touches at Payta.

West Indies.—In this archipelago of islands, perhaps the most important work during the past year is the publication at the Admiralty of a chart of the island of Cuba, in two sheets, on the scale of one-tenth of an inch to a nautic mile. It is compiled partly from the surveys of Captains Owen and Barnett, R.N., but principally from the Spanish charts, corrected by the maps of Pichardo and Coello. Lieut. Murray, in H.M.S. *Skipjack*, has also recently furnished some positions on the south coast. The above is only a

compilation, and confessedly imperfect; but there is little doubt but that it is far better than anything else that exists. It may be hoped that before long we may be enabled to improve it.

The survey of the island of Santa Cruz, by Messrs. Parsons and Dillon, is on the eve of publication, as is also a chart from St. Domingo eastward to Dominica, including Porto Rico.

United States.—Twelve sheets of charts and plans of harbours on the east coast of the United States of America, for which we are indebted to the admirable Coast Survey now so far advanced under Professor Bache, our medallist, have been published during the past year; they include the Delaware River, New York Bay, New London, and other places, the names of which, owing to the constant intercourse between the two nations, are familiar as household words.

Nova Scotia.—In the Bay of Fundy, Commander Shortland, with his staff, composed of Messrs. Scott, Pike, Scarnell, and Mourilyan, have surveyed the coast of New Brunswick from Quaco 25 miles easterly to St. Martin's Head, also from Cape Chiguecto to Cape Sharpe 25 miles, and from Port George to Cape Split, on the Nova Scotia territory, about 40 miles; they have also sounded over a space of about 300 square miles. Four sheets of the Bay of Fundy survey, on a scale of one inch to a mile, have been published during the past year.

On the eastern part of Nova Scotia and Cape Breton, Commander Orlebar, and his assistants Messrs. Hancock, Des Brisay, and Carey, have surveyed about 50 miles of sea and lake coast, including Great Bras d'Or, &c., sounding over 680 square miles. Two coast sheets and three plans of harbours, including Country Harbour, Whitehaven, and Miramichi Bay, have been published in the past year.

Variation Chart.—In continuation of the lines of equal magnetic variation, which have already appeared on the Atlantic, Indian, and Pacific Ocean charts, a Variation Chart of the World, to embrace this information so useful to the seaman and traveller, is being prepared for the present epoch by Mr. Fred. Evans, R.N., chief of the Compass Department at the Admiralty. It will comprise numerous observations recently made by various officers in H.M. navy, who have shown much assiduity in collecting materials. Of these we may especially mention an extended series made by Captain Richards and his assistants in the *Plumper*, on her voyage to Vancouver Island; by Mr. J. Loney, master of H.M.S. *Calcutta*,

on her voyage to India and China; by Captain Ryder, in the *Dauntless*, in the Mediterranean; by Captain Otter, in the Baltic, North Sea, and Hebrides; and generally by all officers engaged in the surveying service. These observations, after the variation chart of the world is published, will be printed, so that those interested may be enabled to examine the data on which the chart is founded.

Besides the works above enumerated as in progress in different parts of the world, the labours of the Hydrographic Office during the past year have consisted in the publication of upwards of 80 new or corrected charts of various coasts, and plans of harbours; of annual lighthouse lists for all countries, compiled by Commander Dunsterville, R.N.; of notices to mariners of new lights, or changes in them, prepared by Mr. G. Marsh, R.N., 1000 copies of which are weekly distributed; of tide tables, with daily predictions for 24 home ports, with the time and height of high water on full and change, for the chief places on the globe, computed by Mr. J. Burdwood, R.N., 1250 copies of which are distributed and sold; of various hydrographic notices of new rocks and shoals discovered, of maritime positions recently determined, all of which contribute materially to the benefit of navigation and the advancement of our knowledge of the physical geography of the globe.

Ordnance Survey.—During the last year the Ordnance Survey has been subjected, as I am informed by its able superintendent Colonel James, to another of those interruptions which for many years past have so marked its progress. In 1856 a committee of the House of Commons recommended that the series of plans which the National Survey should produce should, as respected Scotland, be—

1. Plans of Towns on the $\frac{1}{33000}$ scale, or 42 feet to an inch.
2. Plans of Parishes on the $\frac{1}{33000}$ scale, equal 25 inches to a mile, or 1 inch to 1 acre.
3. Plans of Counties on the scale of 6 inches to a mile.
4. Map of the Kingdom on the scale of 1 inch to 1 mile.

During the year 1856–7 that series was in the course of rapid production and publication, when the House of Commons decided that the larger plans were to be discontinued.

Seeing that by Colonel James's recent introduction of photography the plans on the larger scales can be so economically and rapidly reduced to the smaller scales, whilst the extra cost of plotting the survey on the 25 inch scale instead of the 6 inch is so trifling in amount, the last Government advised the appointment of a Royal Commission, composed of men eminent in science or public affairs,

to inquire into and report upon the whole question of the scales of the survey; the members of the Commission having been Lord Wrottesley, the Earl of Rosse, Lord Brougham, the Lord Justice General, Vice-Chancellor Turner, the Astronomer Royal, the Right Hon. E. Cardwell, Sir Richard Griffiths, General Cameron, Mr. Brunel, and Mr. Vignolles.

It is to be hoped that the Report of these Commissioners, whatever it may be, will be adopted by Parliament, and considered a final settlement of this long vexed question.

The progress of the survey during the last year has, I regret to say, been greatly retarded in consequence of the reduction in the amount of the grant to the extent of 30,000*l.*, and the necessary discharge of upwards of 1000 surveyors and draftsmen.

In England, however, the publication of the large plans of the county of Durham is nearly complete; those of Yorkshire and Lancashire having long since been published. The survey is now proceeding in Westmoreland, Northumberland, and Cumberland: a large portion of each of the two former is already drawn, and will be shortly published; and as the surveyors have now got through the great manufacturing towns and the populous mining districts, and have the more open country before them, a much more rapid progress may be confidently expected, and the completion of the survey of the northern counties may be soon anticipated.

In Scotland, with the exception of a small portion of Lanarkshire and Roxburghshire, the survey of the following counties is complete: Edinburgh, Haddington, Linlithgow, Renfrew, Ayr, Dumfries, Berwick, Selkirk, Fife, Kinross, Lanark, and Roxburgh; and the work is proceeding in Forfarshire, Perthshire, Stirlingshire, and Dumbartonshire. In fact, with the exception of the narrow strip of country along the eastern borders of Scotland to the north of Aberbrothick, the greater part of the cultivated districts of Scotland has been surveyed and drawn either on the large scale of 25 or that of 6 inches to a mile.

The plans on the 6 inch scale are now immediately reduced to the 1 inch scale, and engraved, and I still hope, therefore, to see, in my day, the greater part of our country represented on a map properly so called. Several of the sheets of England and Scotland have been published during the last year, copies of which are in the Society's Map Office; and I beg specially to direct the attention of the Members to the manner in which the features of the ground have been delineated on the Edinburgh sheet, and also

on the Yorkshire sheets. I have been indeed much gratified to learn, that the point for which I have long contended is to be carried out, and that the vast and uncultivated area of the Highland mountains of Scotland is to be represented, when published, on the 1 inch scale only.*

In Ireland, two thirds of the 1 inch map has already been engraved in outline, and more than one-third of the features of the ground has been sketched. The entire map in outline will probably be finished next year, and the engraving of the perfect map with the hill features is in progress.

British Publications.—At the head of the new geographical publications of our country I naturally place the new edition of the work on Physical Geography by Mrs. Somerville, which was last year announced as forthcoming. The varied phenomena of the physics of the globe are, as in the former edition, most logically and clearly put together by this gifted lady, whilst many new and important data are added; thus affording clear evidence that nothing has escaped her penetrating eye; her sound judgment and accomplishments enabling her to condense into a few lines passages descriptive of the great truths of nature. In short, for clearness of method, perspicuity of thought, and vast range of subjects, Mrs. Somerville's 'Physical Geography' must call for our warmest approbation.

The 'Letters from High Latitudes' by Lord Dufferin, which have appeared in the past year, constitute a volume of a very different character. The dashing and spirited manner in which my noble young friend sailed forth on his enterprise, and his gallant bearing when with his little *Foam* yacht he was so fortunate as to traverse icy seas, from which the *Reine Hortense* steamer, conveying Prince Napoleon, was obliged to turn back, the ardour with which he explored the lonely Isle of Jan Mayen, are all enhanced by the unaffected, captivating, and modest manner in which these feats are recorded. I rejoice, therefore, in the accession of Lord Dufferin to our body of working geographers.

Of Mr. Atkinson's remarkable labours in exploring such vast tracts of Eastern Siberia and Chinese Tartary I had occasion to speak at our last Anniversary, when we first saw his striking sketches and paintings. In the mean time, by the publication of an admirably illustrated volume, he has so far made us familiar with

* See Journal of Royal Geographical Society, 1852, vol. xxii. President's Address, p. xc.

countries of great sublimity and wildness, as to incite geographers and naturalists to encounter the many obstacles which our countryman overcame, and bring us back accurate details respecting regions of which we, as yet, know little more than the mere outlines.

Although connected incidentally only with our subject, a work has recently been published which it would ill become me not to notice. The brilliant orator and elegant scholar who has given us his thoughts on the writings of the greatest poet of antiquity, has well said that "To pass from the study of Homer to the ordinary business of the world, is to step out of a palace of enchantment into the cold gray light of a Polar day:" for, whilst we may doubtless plume ourselves on our present geographical knowledge, when compared with that of the author of the 'Odyssey,' as delineated in the map attached to the volumes of Mr. Gladstone, we are forced to admit that whilst the moderns have made great and useful discoveries, and have vastly extended the domain of science, Greece, small as was her territory, has left behind her examples of the sublime and heroic, which, whether they be read of in the philosophic pages of Grote, or in the eloquent passages of Gladstone, have scarcely, if ever, been equalled by any succeeding nation.*

Among practical consulting works and maps the following may be noticed. Blackie's Imperial Atlas has reached its twenty-seventh part, and is expected to be completed in the current year. It will then comprise a hundred separate maps, to which reference will be facilitated by an extensive index now in course of preparation. Mr. A. Keith Johnston has prepared a new General Atlas comprising a complete series of Modern Maps, of imperial size; five wall Maps of the present geography of Europe, Asia, Africa, America, and Australasia. Europe, the first of this series, is to be published immediately. Also a Geological Map of Scotland, by Professor James Nicol, which will be published in June, will contain a vast number of new data, as brought together by my distinguished geological associate.

An improved form of Fullarton's Gazetteer of the World in 1855 is now before the public. The Royal Atlas of Modern Geography has in its publication reached the 16th part, and will be completed in 22 parts. A recent map, showing at one view all the British possessions throughout the world, presents some features of novelty,

* 'Thoughts on the Study of Homer,' by the Right Hon. W. Gladstone, M.P. 1858.

particularly in the manner of overcoming the difficulty of representing so large a portion of the globe as one extended hemisphere, in the manner devised by Colonel James, R.E. The catalogue of the 'Literature of Geography' reaches to the completion of classified works on Africa. This collective view, furnished under the title of a 'Geographical Notice' by Dr. Norton Shaw, meets a great desideratum in the science. Of the numerous new maps or improved editions of older Surveys issued and prepared by our indefatigable associate, Arrowsmith, I will not now speak, as those who wish to study or possess such excellent works know that they have only to repair to Soho Square,

CONTINENTAL GEOGRAPHY.

Russia.—*The great Russian Measurements of the Arcs of Meridian and Parallel.*—The great Russian measurement of the arc of the meridian between the mouths of the Danube and the shores of the Polar Sea, to which I directed your attention in 1845, is fully described in the work by F. G. W. Struve,* my eminent associate of the Imperial Russian Academy, and superintendent of the observatory of Pulkowa.

The progress of this measurement, one of the grandest geodesical operations of modern times, I formerly noticed up to the year 1845, when explaining the operations in Livonia, Vilna, Finland, and up to Tornea, the point, it will be remembered, which was the southern termination of the measurement of the arc by Maupertuis.

In 1850 General Tenner had the satisfaction to push his triangulation as far as the banks of the Danube, and thus conclude his highly creditable labours of 34 years' duration.

As the former measurements of the arc of the meridian in Lapland, by Maupertuis, and afterwards by Svanberg, do not correspond with the requirements of the age, it naturally appeared desirable to extend the Russian operations through Sweden and Norway towards the North Cape. For this purpose Struve obtained the cooperation of the Swedish Government; and thus the whole of the arc of

* This work is entitled 'Arc du Méridien de 25° 20', entre le Danube et la Mer Glaciale, depuis 1816 jusqu'en 1855, sous la direction de C. de Tenner, Lieutenant-Général de l'Etat Major Impériale de Russie; N. H. Selander, Directeur de l'Observatoire Royal de Stockholm; Chr. Hansteen, Directeur du Département Géographique Royal de Norvège; F. G. W. Struve, Directeur de l'Observatoire Central Nicolas de Russie. Ouvrage composé sur les différents matériaux, et rédigé par F. G. W. Struve. Publié par l'Académie des Sciences de St. Pétersbourg.'

meridian was extended to one of $25^{\circ} 20' 8''.2$, reaching from Ismail on the Danube to Hammerfest on the northern shores of Europe. The length of this line, according to Struve's calculations, amounts to 1,447,786.78 toises. The chief meridian of the whole arc is that of Dörpat, which was accurately connected by chronometrical expeditions in 1854 with Pulkowa; the latter place having been previously connected by Struve in the years 1843 and 1844 with the observatory of Greenwich. The longitude of Dörpat Observatory thus obtained is $1^{\text{h}} 46^{\text{m}} 53^{\text{s}}.53$ east of Greenwich.

One of the results of these operations is the very exact determination of a line of altitudes through Europe from South to North; and not the least striking fact among them is, that the Black Sea, the Baltic, and the Polar or North Atlantic Sea at Hammerfest, occupy exactly the same level.

Not less interesting is the Russian measurement of the arc of parallel or latitude extending from Bessarabia in the west, to the mouth of the Volga on the east. Of this work very little is known out of Russia; but the following reliable remarks have been furnished by Mr. Petermann, who obtained them from correspondents in that country. The mean parallel of these measurements is that of Züganesh, or $47^{\circ} 30'$ North latitude, extending from Bessarabia, west of the Dniestr, by Vosnezensk on the Bug; Ushkalka on the Dniepr to Melekhovsk on the Donetz; thence it turns more towards north-east, reaches the left bank of the Volga at Sarepta, and extends along that river as far as Astrakhan. The elevations of this line are of great interest: from Züganesh, which is 1004 feet above the sea, the ground gradually descends as far as the Dniepr, on which Snamenka has an altitude only of 223 feet. Between this point and Kuznetsow the country rises to 825 feet at Medwäd, and beyond Kuznetsow presents a general level of 400 to 560 feet, till at Sarepta it suddenly descends from 427 feet to 63 feet, which remarkable descent was already shown by myself and colleagues in our work on the Geology of Russia. The line of measurement along the Volga first descends *below* the level of the Black Sea at Prishivinsk. This work being in connexion on the west with the Trigonometrical Surveys of Austria, Prussia, and France, the determination of a very considerable arc of parallel between the Atlantic shores and the Caspian Sea is thus established.

Along with these operations may be mentioned the recent conclusion of a very important line of trigonometrical observations extending from Stavropol across the Caucasus to Tiflis, Bayazid,

and the Araxes; and another line from Astrakhan to the mouth of the Terek, Danaya-bashi, and the mouth of the Kur. A comparison of the altitudes of these two lines is curious; for while all points of the Astrakhan line, as far as the mouth of the Terek, are below the level of the ocean, the former line passes over the Elbrus, 18,604 feet, and the Great Ararat, 16,965 feet above the sea respectively.

Imperial Geographical Society of Russia.—Under the Presidency of the Grand Duke Constantine, the Vice-Presidency of that eminent navigator Admiral Lütke, and aided by the zeal and intelligence of its Secretary M. Lamansky, this Society is truly the centre of many of the best scientific explorations of Russia; whilst by its activity we can best measure the remarkable progress of geographical knowledge in this vast empire.

The most important of its recent labours is the exploration of Eastern Siberia, commenced in 1854, and to which I alluded last year. This great work is still in progress, and will probably be completed this year. The vast region beyond the Lake Baikal, and in particular the north-east angle formed by the course of the river Lena and its affluent the Vittim, being a country very slightly known, most attracted the attention of the members of the expedition; whilst other explorations were also extended to the south-eastern frontiers of Siberia, and particularly to the course of the great river Amur. By the arrangements for the survey of the Trans-Baikalian tract, M. Smiriaguin explored the valley of Vittim from its central part to the Lena; M. Ussoltzoff visited the valley of the Nertscha and the superior course of the Vittim; whilst the course of the Bargousine in Northern Angara and its affluents was to be traced by M. Orlof. The object of this expedition was not only to develop the physical geography of this region, but also to collect natural history products and ethnographical materials; the members of the expedition being directed to acquaint themselves as far as possible with the domestic life of the nomadic population, and with their means of subsistence and of communication. At the end of 1855 two of the members (Ussoltzoff and Orlof) returned to Irkutsk with successful results; but Smiriaguin, whose mission was the most important, was assassinated, and all his collections lost—a deplorable event, which deprived the expedition of some of its most important results. Again, it unfortunately happened that the destined successor of Smiriaguin, M. Sondhagen, died of apoplexy before his departure for Siberia. But, notwithstanding such untoward circumstances, some results of the expedition are very inter-

esting. Lieutenant Ussoltzoff presented to the Society the journal of his travels from the mouth of the Nertscha to the mouth of the Bargousine, embracing about 1500 versts. He determined the geographical situation of the principal points, and collected valuable information about the nomades of Olekma and Karenga.

Lieutenant Orlof also presented his itinerary, embracing about 2500 versts. It would be premature, says M. Lamansky in his memoir of 1856, to construct on these data alone a map of the valley of the Vittim, before the longitude of the river is determined. Nevertheless, if we compare the new sketch maps, prepared by the travellers, with the old maps, we observe some important changes. Thus, the sources of the Nertscha Yablonoi-Krèbet were not ascertained before, and the neighbourhood of the Lake Baountof was totally unknown. It can now, however, be said that the geographical positions of all the principal points of the Trans-Baikalian district are determined.

Among these researches, the natural history descriptions and collections of M. Radde are fraught with deep interest. Commencing his observations in 1855, in the basin watered by the Lower and Upper Angara rivers, which fall into the Lake Baikal, M. Radde also explored the borders of that internal mass of water which are now rendered familiar to us by the striking paintings of Atkinson. The following year (1856) was entirely devoted to an examination of a region extending along the frontiers of China, from the Yablonoi mountains by the Argon river, a tributary of the great Amur. In this long tour he made zoological and botanical excursions into the elevated mountains of Tchokondo, the steppes of Abbagaitouy, the Lake of Torey, and the environs of the Dalai-Nor Lake.

In the tracts which surround the alpine Tchokondo, he observed that the vegetable products and animals occupied six distinct regions or terraces, from one of which, and at a height of 8200 feet, he collected many curious species of plants and rare animals. On the Lake Torey he watched the autumnal migration of the birds, and gathered the plants of a great adjacent saline steppe. Noting the periods of hybernation and reanimation of certain quadrupeds, M. Radde has further shown that, since the journey of Pallas in 1772, the herds of that remarkable animal the *Aegoceras Argoli* of the great naturalist, which then abounded in the mountains of Odon Tchalon, in Dahuria, have recently (1831) been entirely destroyed by a severe winter in the mountains of Sektui and Sehir, to which

they had migrated south-westwards; their skeletons now only remaining.

When the vast collection of animals and plants was gathered together and exhibited at Irkutsk, M. Selsky, who examined it, declared that, with the exception of Middendorf, Maksimovitch, and Schrenck, no traveller in Eastern Siberia had equalled M. Radde in the number and diversity of the objects collected; whilst the zoological and botanical maps which he has prepared in illustration of his researches may well be cited as proofs of his powers of generalization by enabling us to compare his data with those of Pallas, and thus measure the amount of change in the productions of nature which has taken place during the last 85 years in a region so little frequented by man, and where nature, untrammelled by artificial appliances, reigns supreme.*

The naval officers and astronomers of the expedition directed to the river Amur, determined the principal bends of the river, and most important results for natural history science were obtained by M. Maak and the other members of the expedition. By their combined labours the maps of the course of the Amur were prepared. All the materials for the natural history of the country were collected and presented to the Imperial Geographical Society by M. Maak, and are about to be published in St. Petersburg.

Both these great Russian explorations are still in progress, and a list of all the astronomical observations, both on the Amur and in the Trans-Baikalian province, is given in the Report of the Imperial Geographical Society of 1857. This list enumerates 115 points, principally along the banks of the Amur and its great affluents. All the most important places of this great river and its general configuration are, in short, made known, and these determinations will serve as solid bases for preparing the map which is to accompany the publication of the results of the exploration of the highly interesting basin of the Amur.

M. Semenov, creditably known as the translator of the excellent work of Ritter into Russian, has been furnished by the Imperial Geographical Society with the means to explore the Russian Altai and the adjacent Kirghis deserts, already brought to the mind's eye of the British public by the paintings of Atkinson. The Russian work will thus acquire an originality of character by its copious additions.

* Bull. de la Soc. Imp. des Naturalistes de Moscou, 1857. No. 1, p. 296.

No scientific traveller (as M. Lamansky writes to me) had previously visited the Thian Chan and Alataou beyond the river Ili. Hence M. Semenoff, following the advice of Humboldt, with whom he corresponded on the importance of explorations in Central Asia, decided to try to penetrate into the Thian Chan and to the southern shores of the Lake Issi-kul. His enterprise was crowned by success. He penetrated without difficulty to the mountains Santache, between the Karkara (affluent of the river Ili) and the Tiub, which falls into the Lake Issi-kul. Thence he continued his way among the armed and turbulent tribes of Kirghis of Little Bukhara, then at war with the Chinese government, and pursued his travels to the East in the valleys of Djirgalan and of the Terek; this last forming the southern shore of the Lake Issi-kul. Before he reached the middle of that lake, the traveller turned abruptly to the south and advanced between the masses of rocky mountains of the Thian Chan through the transversal valley of Zaoukinsk. There, he found those alpine lakes, which, covered with ice even at the end of June, form the exterior or north-eastern limit of the fluvial system of the Syr-Daria. In another excursion to the south-east, from the Santache mountains, M. Semenoff penetrated through the lofty pass of Kosh-Djar, and reached the springs of Sarydjaz, whence flows the principal branch of the Oxus.

Other labours of the Imperial Geographical Society have consisted in the publication of the general as well as detailed topographical maps of the government of Tver. The pecuniary resources of the Society seem, however, to be insufficient for the publication of maps of other provinces which are already prepared.

The two last volumes of the Society's Memoirs (vols. xi. and xii.) contain the very valuable memoirs of Helmersen and Pacht, who have shown the intimate connexion between geological phenomena and physical geography in their explorations of Central Russia from the mouths of the Western Dwina to the Samara, accompanied by new geological maps.

Let me here say that the Imperial Geographical Society has also taken an interest in the expedition to the Caspian Sea, conducted by the distinguished naturalist and geographer Baer, who has published some instructive articles on the fisheries in this sea. Another memoir of Baer explains his views respecting the desiccation of the vastly larger Caspian of former periods. But sound as are all the natural history descriptions of my eminent associate, few geologists, I apprehend, will agree with him that the waters of the

great tract which Humboldt termed "Aralo-Caspian" once stood at the high levels of much of the steppe limestone, which is filled with Caspian shells; but will rather agree with myself and associates, that the great areas of land which surround the present Caspian, and which now separate that sea from the Aral, have been elevated into their present position from a former great interior depression on the earth's surface.

Lastly I may mention a fact, brought to my notice by Professor Katchenofsky of the University of Kharkoff, and now in London, that each University in Russia contributes more or less to geographical science. For example, the professors of natural history undertake every year the explorations of the adjacent districts, and publish their accounts and memoirs. Again, in the University of Kiev there was established some years ago a permanent commission for the description of Western Russia: its publications now form many volumes, and contain the most important materials for the geography, geology, statistics, and history of the governments of Kiev, and the adjacent provinces of ancient Poland.

Germany—Austria.—The Imperial Geographical Society of Vienna is steadily pursuing its useful career in bringing together information from other countries, and in stimulating and encouraging detailed researches which open out a knowledge of the interior of the empire or its coasts.

M. Haidinger has furnished me with good news respecting the successful voyage of the *Novara*, and has also sent to me the copy of a letter from Lieut. Maury to Dr. Scherzer, of that Austrian frigate, which contains so much of real interest to physical geographers, by throwing light on the currents and temperature of the sea, with good suggestions for nautical and physical inquiries, that I hope it will be published in the Proceedings of our Society.

The maps published and the geodetical operations executed in the last year by the Imperial Geographical Institute of Austria, under the direction of General A. von Fligely, are as follows:—Special Map of Bohemia, scale $\frac{1}{144000}$, sheets 2 and 14; Maps of various districts of Hungary, without the relief of the ground, scale $\frac{1}{88000}$; Map of the environs of Gloggnitz, including the railroad over the Semmering, the Schneeberg, and the Rax-Alpe, scale $\frac{1}{32000}$; a general Map of Hungary in $16\frac{1}{2}$ sheets, scale $\frac{1}{88000}$, of which 4 sheets are published; whilst a general map of Wallachia is preparing in 6 sheets on the same scale.

In carrying out the triangulation of the Tyrol from Innsbruck to the frontiers of Bavaria and to the territory of Salzburg, the engineers have determined the attraction exerted on the plummet by some of the mountains. In relation to one point in the middle of the valley of the Inn, and in approaching 530 Vienna toises towards the northern range of mountains, the deviation of the plumb line was 5".7. In the opposite direction, or in nearing the more southern mountains, or the mass of the Tyrol, it was found that for the spaces traversed of 625 and 1333 toises, the corresponding deviations were 6".2 and 10" respectively.

The Austrian Navy have recently made extensive magnetical observations in the Mediterranean, some of the most important of which are due to Dr. Schaub, the Director of the Naval Observatory of Trieste, who has lately visited London.

Of other Austrian publications relating to our subject, the most important are a book on the general Geography of the Empire, by Dr. Schmidt and Professor Wachsmuth; Von Czörnig's comprehensive work on Austrian Ethnography, with a beautiful large map in 4 sheets; and Professor Franz Potter's work on Dalmatia, the most complete relating to that country which has yet appeared.

Other German Researches and Publications.—During the last vacation, when roaming through Germany, I did not fail to visit the well organized and thriving geographical establishment of Justus Perthes, of Gotha, and was much gratified in witnessing the ability with which it is conducted. I am indeed glad to inform you that the 'Mittheilungen,' of which I spoke so favourably last year, has now, as I am informed, a sale of 5000 copies per month—a fact highly creditable to the German public. Having long lamented that we are not sufficiently acquainted with researches relating to Germany, or works published by writers of that country respecting other lands, I requested Mr. Petermann, the intelligent editor of that useful periodical, to furnish me with some data, which I now lay before you.*

* Mr. Petermann has sent me most of the sheets of a Memoir about to appear in the 'Mittheilungen' on the Progress of the great National Maps and Topographical Labours of all European Countries, a highly useful work of reference. See also List of the "Principal Maps of Europe" in our own Map-room.

Among the works of general interest which have recently been published by Justus Perthes and Co., of Gotha, or are ready for publication, are the following (exclusive of the German edition of Dr. Barth's Travels):—Lieut. Van de Velde's large Map of Palestine, in 8 sheets, based on his surveys in 1851 and 1852, and other accessible materials. Along with this map is a comprehensive Memoir, with numerous tables of astronomical and hypsometrical observations, distances, and other data. In connexion with this map, Van de Velde and Dr. Titus Tobler have drawn a large Plan of Jerusalem, also accompanied by

During the past year several laborious investigations have been made to fix the exact altitude above the level of the sea of some central points of Germany, to serve as bases for a mass of hypsometrical data accumulated during many years, and also to set at rest the question of the levels of the Adriatic and Baltic seas. For example, Professor Bohm, director of the Observatory at Prague, has determined the altitude of that place above the Baltic at 99·37 toises, and above the Adriatic at 97·03 toises ; the second part of his investigation, namely, that referring to the level of the Adriatic Sea, remaining, however, uncertain, whilst J. F. Julius Schmidt has fixed the height of the Observatory of Olmütz at 109·81 toises.

The Essay of Dr. Meyn on the Friederichs-Koog, an extensive piece of ground in Holstein, gained from the sea, is a notable addition to the history of the Coasts of the North Sea ; and the most important works on Southern Europe are those of Professor W. Vischer on Greece in the year 1853, and of Professor J. Roth on Mount Vesuvius.

Of German travellers in Asiatic countries, Dr. Roth, to whom I alluded last year, must be specially mentioned ; for his researches will throw much light on countries mentioned in the Sacred writings. One of his best results is his exploration of the Wady Akaba, the watershed or culminating point of which, between the Dead Sea and Red Sea, is ascertained to be at the salt-marsh Godiyán, about seven hours' travelling from Akaba, which is 113 English feet above the level of the Red Sea. Dr. Roth has also made interesting discoveries in natural history, and has noticed that the crocodile lives in the rivers Zerka and Difeh (32° 35' N. lat.), a fact unobserved by former travellers. At present he is exploring the countries east of the Jordan.

a Memoir ; both maps and memoirs being prepared and published in English, in consideration of the interest England takes in these countries, and also of the benefit accruing to their works from English researches. Another work, by F. H. von Kittlitz, 'Reminiscences (Denkwürdigkeiten) of a Voyage to Russian America, Kamtchatka, and Islands in the Pacific,' contains many observations on the zoology and physical geography of these regions. J. G. Mayr's Atlas of the Alps, containing the whole of Switzerland, is now published. This atlas comprises 9 sheets, and extends over all the chain of the Alps and its flanks, the author himself having, during many years, travelled over all this region. Another work relating to the Alps, by Professor Simony, of Vienna, represents in a series of landscape-pictures, highly finished and printed in colours, characteristic geological views of Alpine scenery. A Geological Atlas of Austria, by Franz Foetterle, in Vienna, is far advanced, and will soon be published. A Plan of Prague, and a Map of the surrounding Country, both by Professor Kőriska, of Prague, are elaborately drawn and coloured on a system of contour lines, and are accompanied by a Memoir. A work on Earthquakes, in three vols., by Dr. Otto Volger, particularly on the Earthquakes of Switzerland, is nearly ready ; whilst the Exploration of the Taurus, in Asia Minor, with Map and large Diagram of the Geographical Distribution of the Vegetation, is published by Kolsky, the botanist, who accompanied Russegger in his well-known travels.

Dr. Sandreczki has published an interesting work in three volumes of his journey to Mosul and Urumiyah; and H. Zollinger, many years resident in the East Indian Islands, has recently returned there and recommenced his labours, which formerly were mostly published in Logan's Journal of the Indian Archipelago.

Theodor von Heuglin's little work on a journey to Abyssinia, lately published at Gotha, and now in my possession, contains new matter on the western part of Abyssinia not visited by any other European. This author is the Austrian Consul in Khartum, and one of the most active and indefatigable travellers in Eastern Africa. A perusal of this work, so creditable to the enterprising traveller, particularly for the light which he throws on the zoology and botany of North-Eastern Africa, must be singularly gratifying to our countrymen; since the author describes and figures a very remarkable species of *Musa* of great size, with violet or purple coloured midribs of the leaves, which proves to be precisely the wonderful plant the *Ensete*, described by the great Abyssinian traveller Bruce.* This reproduction before the public of Europe of another of the many original observations of Bruce—observations which to the disgrace of our country were formerly to a great extent discredited—has, I am happy to say, received a still more complete confirmation whilst I write, by the growth of this very *Musa Ensete* to the height of 40 feet in the Royal Botanic Garden of Kew, by my friend Sir W. Hooker, who reared it from the seed sent to him by Mr. Walter Plowden, H.B.M. Consul at Massowah, Abyssinia, in 1853.

Mr. Petermann published last year in the 'Mittheilungen' a portion of the Diary of the extraordinary Hungarian traveller Ladislaus Magyar, of whom I spoke in the year 1853, and who has been residing for several years in Bihé, being married to a native princess. He has recently sent home a portion of his work and a detailed map of Benguela, intending to return to Europe in the course of this year and superintend the publication of this work, which is to appear in three volumes, with detailed maps.

A young savant, Albrecht Roscher, devoting himself to African studies, has produced a work on Ptolemy's Geography of Africa, in which he has attempted to show the correlation between the map of that geographer and the maps determined by the most

* Vol. vii. (8vo. ed., 1805), Appendix, p. 140, and Atlas, Pl. VIII. and IX. M. Heuglin makes no allusion to Bruce's description of the '*Ensete*.' (See Hooker's Journal of Botany, No. XC., p. 210; also note on Abyssinia in the sequel.)

recent researches and discoveries. The principle of Mr. Roscher's interpretation is said to be novel and convincing.

Mr. A. Zurbold, of Leipzig, has brought out a Biography of the lamented Australian traveller, Dr. Leichhardt, and also collected and edited many detached papers and letters of that explorer.

Professor Heller, who has been travelling for several years in Central America and Mexico, has published accounts of the province of Tabasco, and of the region of Orizaba, with map. He makes the heights of the Pic of Orizaba 16,602 Fr. feet, and of the mountain Popocatepetl 16,650 Fr. feet above the sea. Professor Burmeister of Halle, so well known to geologists by his work on fossil crustaceans, &c., who previously travelled in the Brazils, has during the last year been exploring Uruguay, the Pampas, and other portions of South America. A work in two volumes by Julius Fröbel contains a description of his travels and experiences in North and Central America during the years 1849—1856. Though not professing to be a scientific work, it contains, I am assured, much new and interesting matter. Two well illustrated quarto volumes relating to the United States of North America, by Balduin von Möllhausen, have been published. This author, with Lieut. Whipple and Jules Marcou the well-known Swiss geologist, was employed in surveys and explorations connected with the projected railroads to the Pacific. The chief interest of this work, however, consists in its ethnography. An useful work on Chile has been published in French by V. Perez-Rosales, the Chilean Consul at Hamburg.

Cosmos.—Lastly, in mentioning the recently published works of German authors, let me dwell somewhat more on the 1st part of the 4th volume of the 'Cosmos' of the truly illustrious Humboldt.

On this occasion the author quits the consideration of the heavens, so luminously expounded in his former volumes, and treats exclusively of telluric phenomena. The part recently issued consists of two main divisions, in the first of which he treats of the magnitude, figure, density, and internal heat of the earth, as well as of its magnetism. He then pursues his grand fundamental plan; and maintaining the connecting links which unite all telluric phenomena and the representation of the concurrent action of forces in a single system, he devotes the second division to those terrestrial phenomena which are attributable to the reaction going forward from the interior upon the exterior of the planet, or, in other parlance, "volcanicity." This great class of physical agencies is most skilfully elaborated under the respective heads of earthquakes, thermal

springs, springs of vapour and gas (salses, mud volcanos, naphtha flames), and volcanos. The last are described under various heads, in each of which the direct connexion between the *modus operandi* (whether in geological and pre-historic times, or in the present period) and the geographical outlines of the earth is admirably sustained, both from the vast range of personal observation of the author, and from the citation of all those who have studied such works of nature. Although it is impossible to do more on this occasion than stimulate my hearers to read this most instructive volume, of which an excellent translation (with lucid annotations) has been produced by our associate General Sabine, I may specially call your attention to the sketch of the geographical distribution of volcanos. Humboldt estimates that out of 407 volcanos, 225 have been in activity in very modern times; and of these, 198, or $\frac{4}{5}$ ths of the whole, lie within the great "Pacific Basin." One of the important generalizations which he is disposed to draw, from a consideration of their prevalent linear direction, is, that islands and coasts are richer in these outbursts, because, to use his own words, "The upheaval effected by internal elastic forces is accompanied by adjacent depression in the bed of the sea, so that an area of elevation borders on an area of depression, the limit between them exhibiting profound clefts and fissures."

After minutely examining the chemical and mineralogical characters of the rocks produced by volcanic action, and doing all justice to the new classification of volcanic rocks by M. Gustaf Rose, Humboldt concludes this volume by pointing out the importance and extent of the eruptions of molten matter through the great clefts or fissures above spoken of. "He has been led (he says) to entertain the conjecture that a not inconsiderable portion—perhaps, according to volume, the larger portion—of volcanic rocks have been emitted, not from elevated volcanic frameworks, but from a net-work of fissures, on the earth's surface, from which they have poured forth, often forming strata covering an extent of many square leagues."—(English Edition, Sabine, p. 448.)

In a conversation which I held with my venerable friend in Potsdam in September last, just as he was entering his 88th year, he explained to me some of these views with his accustomed clearness and freshness of description; and I then had the satisfaction to find, that in addition to the remarkable volume now issued, a second part would soon follow, in which all organic nature, from its earliest traces in sedimentary strata to the present day, will be exhibited in

harmonious correlation with the physical changes of the crust of our planet.

Switzerland.—To our praiseworthy correspondent, M. Ziegler of Winterthur, so well known for many beautiful maps of his native country, I am indebted for what we know of the progress of Geography in Switzerland. The geodetic and topographic surveys have been continued in the mountains on the north of the Canton of Tessin, and along that part of the chain of the Alps which includes the Cols of Lukmanier, the Little St. Bernard, and the Splügen. Detailed works have been executed in the environs of these passes, whilst triangulation is proceeding on the elevated points above Dissentis and the valley of the Vorder-Rhein.

The principal travels which have been executed during the past summer, were undertaken chiefly with a view to geological researches. Those of Dr. Heusser in the Valais were made in the vicinity of Visp—to observe the centre of a disturbance caused by alarming earthquakes, which have not yet entirely ceased. M. Heusser, being a Professor attached to the University of Zürich, has recorded his own remarks on the localities of those phenomena in a pamphlet* published by the Society of Natural History of Zürich. Chanoine Rion has also given an account of earthquakes experienced in 1855, from June to November.†

During the past winter meteorological observations were likewise made throughout all the extent of the central Alps; repeated luminous appearances having astonished the observers.

By reason of the uninterrupted advance of the works for railways in Switzerland, the number of exact hypsometric data is continually on the increase, and M. Ziegler will continue his communications relating to altitudes along these lines, and will also make us acquainted with the progress of each railway. The Polytechnic School publishes a journal‡ which may be called the scientific organ of that federal institute, and which will describe in detail every Swiss railroad.

Hypsometric charts have been multiplied; and as their utility augments in proportion as we become enabled to compare with accuracy the heights of different countries, M. Ziegler has transmitted to us an extract from a work which he is preparing for speedy

* Das Erdbeben im Visperthal im Jahr 1855.

† Sion, 1855.

‡ Schweizerische Polytechnische Zeitschrift, 4to., Winterthur, 1856, pp. 12.

publication, and which will be noticed hereafter in our own publications.*

France.—Through the Report of the ‘Bulletin de la Société de Géographie’ of Paris by M. Alfred Maury, one of the Secretaries of that Society, we learn that the 20th part of the Map of France by the “Etat-Major,” on the scale of $\frac{1}{384000}$, has been issued. The Dépôt de la Guerre has also completed a reduction of it in 16 sheets, and on the scale of $\frac{1}{384000}$.

The Survey of Algiers is in progress, on scales varying from $\frac{1}{384000}$ to $\frac{1}{384000}$.

Availing themselves of their leisure hours at Rome, the French officers have completed a Map of the South-Eastern part of the Papal Dominions on the scale of $\frac{1}{384000}$, to which has been adjoined a Plan of Rome and its environs on the scale of $\frac{1}{384000}$.

In the neighbourhood of the French possessions in Africa, the officers of the Etat-Major have compiled a Map of the Regency of Tunis, founded upon the observations of M. Falbe; and another, with the assistance of Capt. Baudouin, of the Empire of Marocco.

M. Linant, so well known by his earlier exploits, has produced a hydrographic chart of Egypt, and a map of Etbaye, the country inhabited by the Bichari Arabs.

In addition to the mention of the labours of the Dépôt de la Marine in the last year's Address, we have to thank that office for numerous charts since presented to us, whilst MM. Delamarche and Ploix have completed a line of soundings between Port Vendres in France and Algiers. The late M. Vincendon-Dumoulin, in company with the distinguished surveyor Capt. de Kerhallet, has published a work entitled ‘Etudes sur le Détroit de Gibraltar;’ and in the second edition of the ‘Etudes sur les Ports de l'Algérie,’ lately published, a series of excellent charts has been presented, the execution of which does credit to M. A. Lieussou. Lieutenant A. Boucarut has prepared the nautical documents for the Manual of the Navigation of the River Plata; and Capt. A. Legras has published an excellent work, entitled ‘Description des Iles et des Passages compris entre la partie N. de l'île de Luçon et les Iles du Japon.’ The work of our own Horsburgh on the Indian Seas, already rendered into French by Admiral le Predour, has received considerable additions from MM. Darondeau and Reille. From Captain Cloué we have a notice of the Sea of Azov, of which our associate

* Atlas hypsométrique, avec des éclaircissements.

Capt. Sherard Osborn gave us a description. In addition to the above, Capt. T. de Lapelin has made known his late surveys on the Pacific side of Central America.

On the west coast of Africa, France has taken possession of the territory of Dakar, opposite to Gorée; whilst Capt. Guillain has completed his work on the voyage of the *Duconédic* to the east coasts of the same continent in 1846-7 and 8,—the portion relating to Guiledi, Zanzibar, Meurka, Mombás, and the languages of the tribes on the coast, being of particular interest.

Italy.—Little has been done for the advancement of geography in any one of the Italian States to the S. of Sardinia and the Austrian territory.

The trigonometrical survey of the kingdom of Naples for example, commenced under the late General Visconti, has progressed slowly of late years, the number of officers employed upon it not exceeding twelve at present, who are now occupied in laying down the frontier line with the Roman States. Of the great map of the kingdom, on a scale of $\frac{1}{800000}$, the three first sheets, including Gaeta and the neighbouring provinces, are on the point of being published. They are beautifully engraved, having the principal heights marked. The whole survey of the kingdom, and on the same scale, will consist of 68 sheets. The Topographical department is also now engaged in bringing out a general map of the kingdom, on a scale of $\frac{1}{600000}$, in four sheets. Commander Marzolla, of the same department, has of late years published a series of maps of the different provinces, chiefly derived from Zannoni's map, but with the roads more accurately laid down, and rectifications from the later military surveys of each province have been inserted, with detailed statistical data regarding the population, productions, &c. Although indifferently lithographed, these maps will be found to be useful for the traveller, until the great trigonometrical map is completed.

AMERICA.

Arctic Regions.—A paper by the Danish author Dr. Henry Rink, M.D., has been read before our Society, commenting upon parts of the volume of the lamented Kane. One of the chief points on which he dissents from the opinions expressed in the work of the memorable American explorer is, that the Humboldt Glacier of the latter is not to be considered as the embouchure of the great fluvial icy system

which covers Greenland, but simply as being analogous to the other glaciers of that country, which he, Dr. Rink, had long studied, and on which he has written;—viz., separated masses, which, advancing from E. to W., launch or “calve” their bergs into a succession of fiords.*

The other subject on which the Danish observer is a critical opponent, is the northern extension of the map of Kane as derived from the hasty excursion of the ship-steward Morton. As this last point underwent an animated discussion, in which Sir G. Back, Captain Collinson, and Dr. Armstrong took part, I refer you to our forthcoming Proceedings for the conclusions at which they had arrived respecting the necessity of removing Washington Land some miles to the south, and will now only remark that not a word was said upon the occasion which could in any degree affect the noble and chivalrous character of Dr. Kane.†

Of the expedition sent out by Lady Franklin I have little to add to my last notice of its departure and arrival at Disco, nor is it probable that any other communication will be received until October. We have, however, the satisfaction of thinking that, under the experienced guidance of M^r. Clintock, our friends are at the present moment exploring that hitherto untouched land between Bellot Strait and the Arctic Magnetic Pole, whence they will follow up the steps of our missing countrymen; and though there are some who will not admit the existence of Peel Strait, and more who doubt the possibility of navigating it, there are yet to be found others who, considering how simply the bugbear of rounding Point Barrow has been dissi-

* See Journal Royal Geographical Society, vol. xxiii. p. 145.—Ed.

† After these lines were penned, I received a copy of the ‘New York Times’ of May 6, in which it was announced that Dr. Hayes, the companion of Kane, had laid before the Scientific Association of New York a project for a voyage of exploration to the North Pole by proceeding beyond the limit of Kane’s researches. This bold project is founded on the observations of Dr. Kane and the author, who noted that the growth of the plants, as well as the stature of the natives of their farthest north, together with the great northward migration of birds, were indications of a gradual decrease of cold towards the Pole. Hence it is inferred, that the broad zone of greatest cold, or that of 78° N., being once traversed by a plan indicated, the party would reach an open Polar sea, and a probable temperature of 66°. If the revival of the question of a Polynia should be followed up by an expedition sent out on such scientific grounds, we must truly thank our Transatlantic kinsmen for such a labour of geographical love.

Referring to the discussion which took place when Dr. Rink’s memoir was read, let me here say that I have had great pleasure, whilst this Address was going through the press, in finding that Professor Bache had come to very nearly the same conclusion as Sir G. Back, Captain Collinson, and Mr. Arrowsmith. This result being communicated to the Society at our last meeting of this session, together with friendly explanations, must have convinced Mr. Poor, the representative of the Geographical Society of New York, who was present, that nothing had transpired on the part of our countrymen, in relation to the voyage of Kane, which exceeded the bounds of fair inquiry among men who were seeking out the truth.—*June 25.*

pated, are not without good hope, that to the glory of establishing the fate of our missing countrymen, will be added that of the circumnavigation of America. At all events we may rest assured, that with the certain prospect of a secure retreat in the event of reaching the American Continent, Captain M'Clintock will strive to the utmost to get southwards in his vessel; so that with an experienced commander, a well-found ship, and an able crew, whose energies are directed to a well-known point, we may, under Providence, look forward to a successful result. Still it is not without reason that we are desirous to open a communication with him, and a fine opportunity is afforded to any enterprising person, like the noble author of 'Letters from High Latitudes.' Wager River or Chesterfield Inlet might readily be reached this season by such a vessel as the *Foam*, and the intervening tract of land between the gulfs and the estuary of the Great Fish River crossed in time to secure a retreat before the winter. Here would be the excitement of danger so frequently courted, together with the certainty of sport both for the rod and gun, and the prospect of aiding in the elucidation of that great mystery which has occupied the attention of the civilised world for so long a period!

I cannot quit the theme of Arctic researches, upon which I have long thought with intense anxiety, and on which I have dwelt so much at length at former Anniversaries, without expressing my obligations to our associate Mr. John Brown for his work entitled 'The North-West Passage and the Search after Sir John Franklin,' which he has dedicated to the Royal Geographical Society and myself. In this volume the philanthropic author—at all times in the front rank of those who have sustained the search after our missing countrymen, and who has never given way to despondency—has placed before the reader an able epitome of all the efforts which have been made, as well as the theories which have been formed on this engrossing topic. On his own part, he adheres to the simple view, that the gallant Admiral has been encompassed and held fast by adhering literally to his instructions, and by seeking to force his way in a south-westerly direction from Beechey Island. Not re-entering into this vexed question, which it is hoped M'Clintock may set at rest, and on which so many experienced Arctic authorities have written, some of them believing that, if such was his ultimate fate, Franklin first essayed to force his way northwards and reach an open Polar sea, we must admire the warm-hearted earnestness with which Mr. Brown has

acquitted himself of his task, and has placed before us in a compact form the services of so many of our Arctic heroes.

North America.—British Possessions.—In the Address of last year I entered somewhat into the details of the expedition which, under Palliser and his associates Blakiston and Hector, upon the recommendation of the Council, had been despatched by Government to survey the water parting between the basins of the Missouri and Saskatchewan rivers, and to explore the edges of the Rocky Mountains within our own territories. Since then we have received, through the courtesy of the Colonial Office, several communications conveying the information that Capt. Palliser reached San Josef, an American town seven miles from the British frontier. The bend of the Pembina river near that place is within the American territory; but it has been carefully surveyed, as a large portion of the river flows through British ground. After visiting Turtle Ridge, the expedition reached Fort Ellice, at some distance from which, coal of fair quality was found, and afterwards reached the Qui Appelle Lake, on which is situated the most western station of the Hudson Bay Company's traders. Thence, the explorers started for the Saskatchewan, and in the course of their journey were for the first time compelled to carry fuel with them. The river was found to be navigable for large boats from the point reached, 109° longitude, to Red River. From Fort Carlton, his winter quarters, Captain Palliser proceeded to Fort Pelly, and subsequently to Chicago, Detroit, and Montreal. The paper notices the different Indian tribes met with, the character of the country, the swarms of buffaloes, and the wholesale and indiscriminate slaughter of them by the Indians, and describes the resources of the country, and its adaptability for agricultural purposes. Guides and a party of men had been engaged to assist in the projected operations, and in the summer Captain Palliser intended to start for the south branch of the Saskatchewan, through the country of the Black-foot Indians. From Lieut. Blakiston the Secretary has heard that he had completed and sent the map of the route to Captain Palliser for transmission to the Colonial Office.

The magnetic observations of Lieut. Blakiston and the geological researches of Dr. Hector, from whom I have received very satisfactory reports, will doubtless prove valuable, and may be alluded to with more effect at our next Anniversary.

On that occasion also I trust it may be in my power to report good progress on the part of the survey which, under the command of our Associate Lieut.-Col. Hawkins, has proceeded to co-operate

with the American surveyors and soldiers in defining accurately, and if possible by marked physical features, the boundary between the British possessions and those of the United States lying to the west of the tracts explored by Captain Palliser, and terminating in the Pacific to the south of Frazer River and Vancouver Island.

As this last survey is accompanied by a clever young geologist, M. Bauerman, brought up under my direction, and who is specially versed in mineralogy, I look with great interest to his report of the structure of these hitherto slightly-explored regions, the mountains of which, whether the Cascade range near the coast or the great Rocky Mountains farther in the interior, are simply the prolongations of the two chief chains of the western waterpartings of New Mexico, California, &c.

The natural obstacles to the progress of such a party were, it was well known, the dense forests they must penetrate; and to these I learn, whilst I write, is added the discovery, which might also have been well anticipated in the prolongation of the Californian ridges, of so much gold in the banks of the Frazer river * as already to have caused numerous emigrants to rush to these new diggings; a course which I fear the working men of the American and British surveying parties may be too much disposed to follow.

Canada.—Report of its Geological Survey.—The Geological Survey of Canada, under the direction of Sir William Logan, has issued elaborate Reports, in two volumes, for the years 1853-4-5 and 1856, copies of which have been presented to the Society. A great part of these Reports is necessarily taken up with geological subjects. The first by Sir William Logan gives an account of a large part of the Laurentian formation, which runs from the coast of Labrador to Lake Superior, forming along a large part of its course an important mountain chain, chiefly formed of gneissic rocks, equivalent to the oldest gneiss of the north-west of Scotland and of the Scandinavian chain. Among these rocks, between Lake Huron and the River Saguenay, there are many bands of crystalline limestone. The gneiss proper yields but an indifferent soil, while that derived from the limestones is exceedingly fruitful; the result being that in the gneissic district almost all the farms have been established on sinuous lines of limestone, which, now partly cleared, often penetrate far into the interior of the forest-covered Laurentian chain.

* See the Californian newspapers, &c.

The exploration of fresh countries like large tracts of Canada, or the new territories of the United States, offers continual illustrations of the dependence of geology on geography; for the geologist is often obliged to map the ground topographically while conducting his own labours. Canadian rivers and lakes previously unknown have been thus laid down with precision, and many merely indicated before have been reduced on a series of maps which occupy 22 large plates, filling a quarto volume. These surveys were conducted by Mr. Alexander Murray, and embrace a vast tract of country between the north and east shores of Lake Huron and the river Ottawa. This territory is traversed by the river Myanatawan, which runs westward through a chain of small lakes, and empties itself into Georgian Bay, Lake Huron. Again the Muskoka river passes in a winding course of about 150 miles through a series of lakes to Burnt Island Lake, about half way between Lake Huron and the Ottawa. Near this point the Petewahweh rises, and flows north and east, emptying itself into the Ottawa at Upper Allumette Lake. On the north shore of Lake Huron large rivers of the same character are now for the first time accurately mapped, called respectively Spanish River, White Fish River, and Wahnapiatae River, which unites the lake of the latter name with French River, about ten miles from one of its mouths. This French River is of great geographical importance, uniting as it does by several channels the north shore of Georgian Bay of Lake Huron with Lake Nipissing, which is about 50 miles long by 20 in breadth. The eastern shore of Lake Nipissing is only a few miles distant from Upper Trout Lake, which, through the Mattawa river, communicates with the Ottawa in latitude $46^{\circ} 18' 12''$. It is in contemplation by the Canadian Government, if practicable, to construct a ship canal through these rivers and Lake Nipissing, so as to unite the Ottawa and Lake Huron. This would shorten the distance from the east to Chicago by 600 miles.

In the year 1856, on the same survey, an exploration of the island of Anticosti, in the Gulf of St. Lawrence, was made by Mr. J. Richardson. This island is about 140 miles long by 35 in breadth, and consists partly of Lower Silurian rocks, but chiefly of a series of limestones called the Anticosti group by Sir William Logan, containing as they do a suite of fossils somewhat peculiar and intermediate in character between those most characteristic of the Lower and Upper Silurian rocks, like those of the British strata to which I have assigned the term Llandovery rocks. Mr. Richardson walked

round the island, which is quite uninhabited, except at the lighthouses. The coast is intersected by numerous streams, and a great part of it has a belt of reefs dry at low water, the outer edge of which forms a cliff from 25 to 50 feet high, that evidently constituted an old coast line when the land stood relatively to the sea at a higher level than at present. The south side of the island is generally low, but on the north it rises in a succession of ridge-like elevations to a height of from 200 to 500 feet above the sea. The country is covered with wood, chiefly spruce, varying from 8 to 18 inches in diameter, and from 40 to 80 feet in length. Besides this, it is reputed to bear "pines," poplars, mountain ash, cranberries, a species of gooseberry-bush, red and black currants, strawberries, species of peas, &c. Potatoes have been cultivated successfully on the south side of the island, also Timothy grass and clover, and Mr. Richardson observes that he saw half an acre of barley 4 feet high with a strong straw and well-filled ear. The wild animals in the island are black bears, the red, black, and silver fox, and the marten.

Canada may, indeed, well be proud of this survey, the great explorations conducted under the direction of Sir William Logan having added almost as much to our knowledge of the topographical and natural history characteristics of the country as of its geological structure.

Central America.—Reserving for our next Anniversary an account of the progress of geographical knowledge in the United States, let me now call your attention to a commercial enterprise which seems to afford a valuable opportunity for the extension of our acquaintance with a region hitherto imperfectly known. Of few portions of the world within the bounds of civilization is our knowledge perhaps more circumscribed than of Central America. It is stated by a recent traveller (W. V. Wells, 'Explorations and Adventures in Honduras') that even as respects the leading towns the true position of but few is given with any accuracy. A Company composed of influential persons, at the head of whom is that liberal merchant-prince Mr. W. Brown, M.P. (who munificently bestowed a great free public library and school upon the town of Liverpool), is about to construct a railway across Honduras, to establish a commercial passage between the Atlantic and Pacific Oceans. For the last twelvemonths this Company has had a numerous staff of engineers upon the ground. Struck with the importance of the project (for the direct distance is only 160 miles,

and the railroad it is estimated will not have a greater length than 180 miles), Her Majesty's Government have sent out Colonel Stanton, an officer of the Royal Engineers, to inspect the survey, which is now completed. A chemical geologist and naturalist (Mr. Kirkpatrick) is also proceeding to Honduras to explore the mineral wealth and physical geography of the country, and the productions and quality of its soil. There will, therefore, not long remain any doubt respecting the capabilities of Honduras. Already we know from the work of Mr. E. G. Squier, that its harbours on both oceans, and its natural valley from sea to sea, intersecting the Cordilleras by the courses of the rivers Humaya and Goascoran, point out this tract as a great highway of commerce. In anticipation of the good results which are likely to follow from this effort of British capitalists and the suggestions of Mr. Squier, let me add that, out of near 60 persons hitherto employed during a year in a tract which has been considered insalubrious, not one death has occurred.

Through our active associate, Mr. John Power, of Panamá, we have received notices of various works in progress bearing upon the geography of these important but still very imperfectly mapped countries.

Dr. Wagener, the German traveller, was by the last accounts at Panamá, proposing to devote some time to an examination of the geography of the isthmus.

Of Guatemala an entirely new map is preparing for publication by Mr. Van Gehucht, a civil engineer, who has spent eight years on a trigonometrical survey of this state, in which he has determined by astronomical observation the true position of all the principal towns, as well as of the leading physical features of the country. Our correspondent, Mr. Power, has sent us a portion of the positions so determined, which will appear in the next volume of our Journal. To him we are also indebted for the translation of the first part of 'A Description of the State of San Salvador,' by Mr. Sommenster, an engineer who has been employed in making a new survey of it for the Government, which will shortly be published. Costa Rica has been partially surveyed by an English Company from Port Arenas, on the Pacific, to San José, the capital, a portion of the isthmus said to be now very incorrectly laid down.

Mr. F. M. Kelley, of New York, well known as the originator of the proposed great ship-canal across the Isthmus of Central America *viâ* the Atrato river, has sent to us the interesting report

of Lieut. N. Michler, in charge of the topographical party sent by the United States Government to survey that part of the country. Lieut. Michler announces to the Navy Department, that he has completed his topographical survey across the Isthmus from the Gulf of Darien to the Pacific, along the line for the interoceanic canal proposed by Mr. Kelley. The practicability of the route, says Lieut. Michler, can only be determined upon after the necessary examination of the results of those labours.

South America.—On the river Meta, an important tributary of the Orinoco, steam vessels have been established by a Venezuelan company, whereby an opening has been made into the very heart of the country for the outlet of the products of the interior provinces of New Granada.

A new map of the State of Equador has been completed, after many years' labour and study, by Dr. Villavicencio, a native, who proposes carrying it to Paris himself for publication.

In Chile an exploratory expedition has crossed the Andes into the Indian territory south of Valdivia, to examine the lake of Nahuelhuapi, the site of an old settlement of the Jesuits, supposed to be the source of the great Rio Negro, which crosses the continent, and falls into the South Atlantic in latitude 41° ; the details of which are promised to be sent to us.

The long pending dispute between Brazil and Paraguay relative to the opening of the upper waters of the river Paraguay has been recently settled by an amicable arrangement throwing open the navigation, in virtue of which the products of the rich province of Matto Grosso may now for the first time be exported by water-carriage, and we may look perhaps for some new data regarding a vast region very little known to Europeans.*

ASIA.

Syria.—Pushing onward to the east and south in the Pashalik of Damascus, beyond the explorations of Seetzen, Burckhardt, Lindsay, Porter, and all previous travellers, Mr. Cyril Graham has, through the good will of that singular people the Druses, contrived to visit the very remarkable tracts to the east and south of the Hauran,

* The reader who may wish to obtain more knowledge on the subject of the various parts of America than I here allude to must also consult the works thereon by German authors.—*See ante*, p. 285.

called es-Safáh, el-Hárrah, and the whole eastern borders of the Jebel ed Druz. He has given us, in short, a most able and animated sketch of a region which, occupied successively in olden times by powerful and civilized races, is now a desert, over which wandering and predatory Arabs, almost alone, hold sway. The es-Safáh is a highly-broken basaltic district, which extends to the N.N.W. into a chain above 30 miles in length, not marked on any map. The el-Hárrah, on the contrary, is a broad lower zone of loose basaltic fragments, forming the western belt of the broad rich plain lying between the Hauran mountains and the river Euphrates. After a description of the physical geography of this long forgotten region, the author describes the position of numerous cities scattered over the desert to the east and south of the Hauran, which, though wholly uninhabited, and for the most part roofless, are in many respects as perfect as when the olden people lived in them. Agreeing with Porter, that the Hauran must be the ancient Bashan of Scripture, Mr. Cyril Graham believes that the towns lying to the east of it, and which he discovered, are of a still older date, and were probably the work of the first Hamite emigrants from Shinar. He also collected very curious inscriptions in an unknown character, which have not yet been deciphered.

In reviewing the adventurous and successful travels of Mr. Graham, of which we shall soon have a detailed account in our Journal, we painfully recognise the fact, that a once highly cultivated, richly wooded, and densely peopled country, which after the times of Holy Writ was successively occupied by Greeks, Romans, Christians, and Saracens, has been reduced to a desert, supporting only a few nomadic tribes of Arabs.

The desiccation of the country may in great part be attributed to the destruction of once stately groves of lofty trees, which attracted the clouds and moisture, as well as to the demolition of those great reservoirs of water which the ancients constructed; but we are forced to the conclusion, that the main cause of this wide-spread sterility is the misrule of ages, and the inability of the Turkish Government to protect any industrious and settled inhabitants from the incursions of lawless Arabs. In the mean time it is refreshing to know from Mr. Graham, that the persevering Druses, to whom he was so much indebted (and who now supply the indolent inhabitants of Damascus with nearly all their corn), are extending agriculture, with muskets over their ploughs, into the richest spots of this *terra incognita*, and are thus explaining to us how such lands may in

ancient times have fed and supported the people who dwelt in the vast number of deserted cities.

India—Himalaya, Karakorum, and Kuen Luen chains.—Résumé of British Labours in India.—At our last Anniversary one of our Gold Medals was justly bestowed upon Colonel Waugh for surveying and laying down on maps a vast area of the Peninsula of India, and for determining that the Himalayan range, the loftiest mountains in the world, reached their culminating point in Mount Everest at the height of 29,002 feet, considerably to the west of the point hitherto supposed to be their summit. On the same occasion I spoke to you of the recent travels of the three brothers Schlagintweit, particularly in Upper India, and the mountains to the north of it.

Unhappily there is too much reason to believe, according to native report, that Adolphe Schlagintweit, who was left exploring in the countries beyond Ladak, and far to the north in the direction of Yarkand, and from whom no letters have been received for more than a year, has fallen in an action with the Chinese, in their war against the people of Turkistan; the fruits of his enterprise being, it is feared, lost. As, however, the reports of the natives proved unreliable in the case of our excellent explorer Moorcroft, let us hope that Adolphe Schlagintweit may still be spared to bring home to us some knowledge of the Yarkand territory.

The other brothers, Hermann and Robert, have now deposited at the India House their manuscript observations, numbering 43 large volumes, accompanied by maps indicating the distribution of their 88 magnetic stations, numerous meteorological observations, including all those which they obtained from various officers of the Company, and the localities where their plants were collected.

A considerable portion of their collection has indeed been already set up in the Museum of the India House, including transverse sections of trees, and facial casts of the people among whom they travelled, which, being taken from the living person of races little known, must be of value in ethnographical science.

Geographers must desire to see the results of these labours published, not only as relates to terrestrial physics and magnetism, but specially by the production of a map, on which shall be laid down the northernmost of those explorations of which, on the authority of Humboldt, I spoke last year, and to which I now revert: for it is indeed unquestionable, that the Schlagintweits did proceed farther to the north and by east, in the meridian of Ladak, than any other European traveller.

As a resultant of the numerous surveys and travels of our countrymen who have explored northwards from Hindostan, I may remind you that the gigantic peaks which enclose the lofty plateau of Tibet, and separate India from Turkistan, have generally been considered by British geographers to constitute one vast mass, or sea of mountains.* They were indeed so spoken of when I had the honour of delivering our Gold Medal to Henry Strachey, one of the best surveyors of large parts of this rugged region. Concentrated upon the west, in a knot or group, at and around the Hindu Kush, these mountains expand thence to the east and south in fan shape, their southern portion, the Himalaya, being the loftiest elevations in the world, and forming the northern boundary of India. Farther to the north, and beyond the plateau of Tibet, comes another band of parallel altitudes, which, also proceeding south-eastwards from the lofty western knot, is known near that meridian as the Múztagh, and acquires, a little farther to the east, the synonym of Karakorum. This last range, which, still farther to the east, is the Kailas of British topographers (adopted from the Hindú mythology), has for some years been marked on maps as the watershed of the mountain region which separates the drainage of India from that of Turkistan and China.† It throws off to the south the Indus, Sutlej, and Brahmaputra; the two first, after wandering westwards, and the last eastwards, in the plateau of Tibet, escape southwards through gorges of the mighty Himálaya, whilst to the north it sends off minor streams, the western ones of which, from whatever authority derived, have been for some years laid down on maps as descending from these mountains into the north-western low country of Yarkand.‡

In alluding to this axis or waterparting, it is a fact that it has not been traversed by any European proceeding northwards from India, though I specially invited your attention to that adventurous journey of Dr. Thomson when he ascended to the summit of the Karakorum

* See Phys. Geography—Western Tibet; Journ. R. Geograph. Soc., vol. xxiii. p. 1.

† Called “Thsoug-Ling” mountains in St. Martin’s map, accompanying Julien’s Travels of Hiuen-Tsang.

‡ See Map accompanying Hügel’s ‘Travels in Kashmir,’ prepared by Walker (small general part thereof), and Arrowsmith’s General Map of Asia, 1841; also the Map accompanying the Travels of Moorcroft and Trebeck, published 1841—some of the materials for the northward drainage from the Karakorum having been doubtless those collected by Mir Izzet Ullah, the remarkable servant and *avant-courier* of Moorcroft, whose travels beyond the Himálaya, through Tibet to Yarkand, and thence by Samarcand to Bokhara, &c., were translated from the Hindu by Professor H. Wilson in the Calcutta Oriental Quarterly Magazine of 1825, and republished by the Royal Asiatic Society.

pass. The same chain was, however, passed over in its far eastern prolongation by those very remarkable missionaries Huc and Gabet, though, unfortunately, they have given us no materials by which we can define its orographical features.

Now, the feat of the brothers Schlagintweit, of which I partially spoke last year, was, that leaving the Karakorum to the south, they traversed a diversified and broken plateau of about 16,500 feet average above the sea, and of about 100 miles in breadth from south to north, when, reaching a depression extending from west to east, they found between it and the low country of Khotan, another parallel east and west range, one of the heights of which they determined to be from 19,000 to 20,000 feet above the sea.* According to these travellers, this is the Kuen Luen (a Chinese name) of Klaproth and Humboldt, and is so called by the natives. Leaving these mountains, and descending to Elchi or Iltchi, the Khotan of Marco Polo, in the lower country of Turkistan, they were unable to reach Yarkand, and then returned to Ladak by another route, or that which leads from the former to the latter place. The rivers which they mention as separately flowing northwards, and which they have personally examined, are those of Khotan, Karakash, Yurongkash, and Keria, two of which were engraved in Arrowsmith's map of Asia (1841), from a large Chinese map at the India House, brought home by Colonel Reeve.

I here, however, repeat what I stated last year; viz., that the Schlagintweits are the only geographers who have visited those localities. They sustain, in fact, the view of Humboldt, and affirm that his Kuen Luen presents all the characters, relations, and altitude of an independent chain, as laid down by that great geographer in his 'Asie Centrale.'†

In anticipation, then, of the publication of such maps as their very arduous and difficult journey enabled them to make (they being disguised as natives), let us willingly accord to these brothers (one of whom has, I fear, paid the penalty of his life for adventuring too far into those wild tracts) the merit of having penetrated so far northwards as Khotan. Let me add that their drawings and paintings—particularly those of some of the great glaciers—are most striking and effective.

* Mir Izzet Ullah makes the distance from the north face of the Karakorum to Yarkand between 120 and 130 hours of march, which he accomplished in a caravan in seventeen days.

† See Humboldt's 'Asie Centrale,' 3 vols. and Map. 1843.

In alluding, however, last year to other labours of these gentlemen, I much regret to have unwittingly attributed to them geographical results in the Kumaon territory which it is well known were mainly accomplished, more than thirty years ago, by the very able British officers of the Trigonometrical Survey of India; viz. Captains Webb, Hodgson, and Herbert.*

In that survey, those officers measured the altitudes of such a number of peaks averaging upwards of 20,000 feet, that references were made to them by numbers instead of by printed names, among which the No. 14, which is the Nundi-Devi of my last year's Address, was separately measured by Hodgson and Webb, the former placing it at 25,749, the latter at 25,669 feet—a striking proof of the concurrence of the independent labours of these hard-working and excellent geographers.

Again, the glaciers of the river Pindur are laid down in the same map, and Capt. R. Strachey, Col. Madden, and other British officers have carefully examined these glaciers since that time. In fact, the orography of the mountains between the Kalee and the Sutlej, including Kumaon, has long been known; though the Schlagintweits made some interesting additions to the physics and the pictorial delineation of these tracts.

Nothing could be farther from my thoughts than not to sustain the hard-won laurels of the many British subjects who have earned great scientific reputation in the Trans-Himalayan regions; and no one who has perused the 'Asie Centrale' of Humboldt † can doubt that he has striven to do honour to our Moorcroft and Trebeck, the brothers Gerard, and all our earlier explorers, whilst in subsequent

* See Sheet 66 of the Great Map of the Trigonometrical Survey of India, issued by Horsburgh, 1827. I have the more been called upon to correct this *erratum* in my preceding Address, and to register the antecedent labours of some of the many British geographers and engineers, in consequence of a document presented by the MM. Schlagintweit (in September last) to the East India Company, in which they specify all their intended publications, without referring to the labours of their numerous predecessors in the regions through which they travelled. This document, which was not intended for publication, unluckily found its way into a periodical, and naturally gave umbrage to those who thought that numerous observations of our countrymen were slighted. In justice, however, to MM. Schlagintweit, I must state that they have assured me of their having always intended to enumerate the labours of their predecessors, as well as to refer gratefully to all those persons who kindly aided them; and they claim to be not judged by a mere MS. announcement of *their own* researches.

† I speak only of what Europeans have done in the region under discussion; for besides what was done by Moorcroft's man, Mir Izzet Ullah (*see* p. 301), Major Cunningham has shown, in the Asiatic Journal of Bengal, that as early as the year A.D. 414 the Chinese traveller Fahia explored some of these mountainous regions; and in his translation of Hiuen-Tsang's Travels in India during the seventh century, M. Julien also mentions the knowledge which the Chinese had acquired of this country.

works, including those with which I have myself been connected, such as the volumes of the Geological and Geographical Societies, there has surely been no remissness in acknowledging the highly-important and original labours of several of these remarkable men.

For my humble part in bearing testimony to the deserts of my countrymen, I refer you to several of my Anniversary Addresses, but particularly to that of 1852, when, after presenting the Gold Medal to Henry Strachey for his arduous services in completing a map of Western Tibet, I specially spoke of the successful explorations by my countrymen of "that part of Asia to which, as Englishmen, we attach deep interest, as constituting the northern frontier of our Indian possessions, which geographers revere as the loftiest region of the earth, and which it has been the ambition of Humboldt through life to visit in person."

Nor need we go far back in scientific history to note that one of the greatest additions to the science of physical geography was made by our countrymen Hodgson, Herbert, Colebrooke, and others, who, despite the incredulity of European philosophers of mark, demonstrated that the Himálaya mountains were the loftiest in the world!

In here reverting to a few only of these men, let me remind you, that whilst Henry Strachey received our Gold Medal, his brother Richard justly obtained the admiration of geologists for his clear and faithful description of so large a range of the region on both sides of the Himálaya, including the territory of Kumaon. Most assuredly I never could be oblivious of the services of the man who had been the first to demonstrate the existence of Silurian rocks near the Himálayan axis! * I further endeavoured to bring to your mind's eye the researches, in regions never before visited by European naturalists, of Joseph Hooker in Eastern Tibet, and of Thomson in Western Tibet, † researches so well conducted in many branches of natural history, and particularly of botany, as to have won for them the admiration of all enlightened men.

Again, did not geologists and geographers, with whom I have been acting, long ago recognise with gratitude the real merits of our Indian explorers, Cautley and Falconer, when they put forth their remarkable description of the wondrous fossils of the Sewalik hills?—researches all the more striking and praiseworthy, since the authors not only defined a new range of elevations as

* Quart. Journ. Geol. Soc., vol. vii. p. 292, and vol. x. p. 249.

† Royal Geog. Soc., vol. xxii., President's Address.

perfectly separated from the Himálayan chain, but, when far distant from all the means and appliances of Europe, actually described forms of extinct vertebrata never before brought to light, and assigned to them their true places in the animal kingdom.

In mentioning the name of Falconer, I cannot but regret that a large portion of the researches of my valued friend have never been laid before the public. Thus, I have ascertained that in 1838 he crossed the mountains of Iskardo, and followed up one of the sources of the Indus by the valley of the river Braldo to about 36° N. latitude, on to the glaciers which hang upon the southern face of the Muztagh or Karakorum, afterwards explored by Thomson, and which there separate the great steppes of Tartary, and the affluents of the Oxus, from the drainage of the Indus. Assisting in measuring a base line in Cashmir, in company with the late Colonel Mackeson, he amassed a large collection of plants from the Muztagh range, Western Tibet, and Cashmir, Lower Affghanistan, the Salt Range, and the Punjab, which valuable accumulations are at length being examined at Kew, under the direction of Sir William Hooker and his son.

Such labours as these, and many unregistered data, deserve to be accurately chronicled among the feats of our exploring countrymen in India, as well as the labours of Jacquemont, Hügel, Vigne, Winterbottom, and others, which have been noticed in our Journal, and are well known to geographical readers.

But here let me observe, that the writer who would bring together the numerous observations of all observers and travellers in various parts of India, which are scattered through a variety of periodicals, would render immense service to science. Many of these labours, as far as they relate to botany, geography, and geology, including those of my lamented friend the adventurous Burnes, have been frequently brought under your notice, whilst those of the distinguished botanist Royle have been feelingly adverted to by my contemporaries in mourning over the recent death of that eminent man.

In relation to geology, many of you are well aware that much light has been successively thrown upon the sister science by the labours of a host of observers, besides those I have alluded to, in various parts of Hindostan, among whom the names of Sykes, Franklin, Malcolmson, Christie, Newbold, Vicary, Fleming, Carter, Buist, &c., are honourably enrolled.

Let me also add, that I entertain a most sanguine hope that, with the re-establishment of order, the geological survey of India

will, under the direction of Professor Oldham, be brought into a condition of great usefulness to the empire, whilst under his able guidance it cannot fail to evolve results of great interest to pure geological science, some of which are indeed already foreshadowed in materials forwarded by him, which are now under consideration in this country. Although it is not my province to dilate on geological subjects, it gives me real pleasure to state that, as Governor-General of India, Lord Canning has taken a warm interest in the promotion of geological science, both by the enlargement of the Geological Survey formed during the Government of Lord Dalhousie, and by the addition of a School of Mines, thus testifying his sense of the necessity of opening out effectively the mineral resources of the Indian empire.

China.—The political arrangements which are pending will, it is hoped, result in the opening out of this vast empire, and in obtaining for us a much better acquaintance with the geography of its interior than we now possess. It is possible, though not probable (considering the suspicious character of the Manchu, or reigning dynasty), that the negotiations of our Government may result in the residence of a British minister at Peking, and, if so, a field for geographical investigation will be opened in Northern China, a region hitherto little visited by any Europeans except the Russians, and in early times by the Jesuits. But if this effort should not be successful, the mere laying open to the enterprise of our merchants, of the great river Yang-tze-kiang, which waters the vast plain, in the centre of which lies the ancient capital Nankin, will obtain for us an acquaintance with the chief interior parts of China. It will, in a word, give us access not only to the town of Han-Kow, perhaps the largest mart for commerce in Eastern Asia, which, situated 500 miles from the coast, is accessible to ocean steamers, but also to all the sites of mineral wealth.

The importance of this river as the high road into Central China was recently pointed out to the Society in a memoir, equally instructive and judicious, by our associate, Mr. W. Lockhart, who had resided many years in the country as a medical missionary. According to this experienced writer, and the concurrent testimony of Mr. Consul Alcock, as well as of several naval officers, most signal advantages must follow from opening out this great water-course, which would bring Europeans into immediate commercial connection with the one hundred millions of people who inhabit its fertile banks and those of its affluents.

A remarkable circumstance connected with physical geography, to which Mr. Lockhart directed our notice, and one that will doubtless attract great attention, is the change which has taken place in the course of the Hwang-ho, or Yellow River to the sea. Instead of flowing to the south of Shantung, as formerly, this mighty stream has shifted its embouchure to the north of that promontory, falling into the gulf of Pih-che-le, 200 miles from its former mouth! This is one of the many proofs of the decline of vigorous government in China. In earlier periods the embankments of the rivers were carefully watched and repaired; but neglect has led to the breaking down of all artificial ramparts, and vast fertile tracts have consequently been sterilized.

Although unacquainted with scientific geography, and the relations between astronomy and geography, the Chinese possess, it appears, remarkable geographical and statistical accounts of the whole empire. A work called the Ta-tsing-yih-tung-che, one of many similar publications, enters minutely into the topography, locality, and limits of every province, city, town, village, and hamlet in the empire, and gives the minutest details regarding the population, products, commerce, and characteristics of the different places described.

Of all the recent donations made to our Library, no one has more gratified me than the offering of Mr. Lockhart, of the Te-le-tseuen-che, or a compendium of elementary geographical science, in two volumes in the Chinese language, as prepared by his associate, the Rev. W. Muirhead, and published at the expense of the late Mr. L. Dent, an English merchant. Translating the works of our most popular authors, and illustrating them with maps, diagrams, and drawings of animals, our good countrymen who have already issued two volumes,—one on political, the other on physical geography,—have thus taken the best method of breaking down the barriers which have so long separated us from this peculiar but most intelligent, ingenious, and laborious race.

Had it not been for the present troubles in China, much would have been accomplished in the survey of the coasts of Tartary and Japan. For that purpose H.M.S. *Actæon*, under the command of that deeply-lamented officer the late Captain Bate, was despatched from England last year, but having been detained before Canton, the object of her voyage was postponed. Besides the knowledge of the course of the great rivers, we have yet to obtain an acquaintance with the northern coast-line to the gulf of Pih-che-le and Leaou Tung, as also with the whole of the coast of Corea.

The Russians, as already stated, have long had intercourse with the northern provinces of China ; in fact, their overland commerce with the Chinese is of far greater antiquity than our maritime trade with this people. Russia has also had, for many years, a religious establishment at Peking, which she has enriched of late by attaching to it various men of science, whether miners, geologists, or astronomers. Of the former, Major Kovanko, of the Imperial School of Mines, long ago published an account of the coal produce of the environs of Peking. M. Constantine Skatschkof, who has resided nearly eight years at Peking, as Director of the Russian Observatory there, and who, having recently returned to Europe, has just visited London, informs me that he has also prepared an account of those rich coal fields. Though not professing to be a geologist, this accomplished gentleman, having inspected the fossils of the Museum of Practical Geology, had no hesitation in recognizing among our British types, Silurian Graptolites and Orthoceratites, with Devonian Spirifers and Carboniferous Producti, as being forms which he had seen around Peking.

As a large collection of these remains will be brought to Petersburg next year by M. Vasilefsky, the medical officer of the Russian Mission, we shall know precisely the extent to which the same fossils extended from Britain to China in the palæozoic times. Already, indeed, we may feel pretty certain that such a diffusion of similar types prevailed ; for Mr. Lockhart has furnished me with fossil shells from the interior province of Sze-chuen, which are identical with species of Devonshire and the Boullonais.

Possessing these palæozoic rocks, with many ores and metals, and vast and rich coal fields, the empire of China, with its rich products of the soil, lies before us as a wondrous mine of wealth and lucrative commerce, which when opened out to Europeans may operate greater changes in our international relations than all the gold of California and Australia.

From the knowledge we have already obtained of the central and southern parts of China, it would seem pretty certain that we have attached too great an importance to the territory around Canton, which is cut off from the vast central and most populous portion of the empire, watered by the Yang-tsze-kiang, by a chain of mountains at no long distance from the seaboard. Hence the rivers which flow from that ridge to the south, being short and small, are valueless as highways for commerce, when compared with the great central stream which flows from east to west for a distance of 3000 miles.

Though this is no place for political digressions, I must be forgiven if I make public a fact which has come to my knowledge from two reliable and independent sources respecting a Chinese public character, the Mandarin Yeh. Looking to the rigour and apparent wholesale cruelty of his measures when governor of the province of Canton, the English public have been led to regard him as a monster of cruelty. I am, however, assured, by both Mr. W. Lockhart and M. Skatschkof, that Yeh simply carried out the orders of his Government, which shows no mercy to rebels;—the latter, indeed, having spared none of the Imperialists, including a number of Yeh's relations. On the other hand, my informants affirm that Yeh is an example of virtue in China; inasmuch as though he might have become very rich at the expense of the natives, who are usually oppressed by the Mandarins, he is a poor man—further, it is stated that he is a very learned person, who, owing all his advancement to his superior knowledge, has larger and more enlightened views of government than most of the leading men in China.

Chinese emigration appears indeed to increase from year to year, and, in regard to our own possessions in the Indian Islands and Australia, we can already reckon about 150,000 Chinese settlers or subjects. Again, our imports of the two Chinese commodities, viz. tea and silk, amounted, during the last year, in value to twelve millions, whilst the two articles, of tea in England and opium in China, yielded to the English and Indian exchequers a revenue of nine millions sterling.

These simple facts proclaim the vast importance of obtaining a better knowledge of an empire which contains at least one-third part of the whole human race, and whose inhabitants are more ingenious and industrious than any other Asiatic population.

Asiatic Archipelago.—On the subject of the great Asiatic Archipelago, three papers have been read before the Society, to which I shall presently particularly advert. It is just three centuries and a half since this large portion of the globe was first made known to the civilised world, and the larger portion of it is still to be discovered as a field for future exploration. A few words, derived from my friend Mr. J. Crawford, will convey a notion of the geographical importance of this field of discovery. The high-road of nations to the empire of China, the Hindu-Chinese countries and Japan, lies inevitably through this Archipelago. It contains four of the largest islands in the world, Borneo, Sumatra, New Guinea, and Luçon, with an united

area of 630,000 miles, or six times the extent of the British Islands. The longest volcanic band in the world runs through the whole Archipelago, to the length of at least 3000 miles. This band (containing no fewer than 45 active volcanic mountains, the lowest of which is higher than Vesuvius, while the highest exceeds Etna), is a distinct region from the non-volcanic portion, and is, by its fertility, distinguished from the crystalline and sedimentary portion.

This non-volcanic portion of the Archipelago, by far the larger, has, however, its peculiar advantages; for while the useful metals are wanting in the volcanic region, they abound in the other. This non-volcanic region contains the richest and the most extensive tin field in the world; for that ore is found, at intervals, over seventeen degrees of latitude; and while its produce is as yet confined to the washing of the alluvium containing the ores, the yield of metal is already double that of Cornwall. Iron ores of excellent quality are found in Borneo, which island also contains mines of gold, which were considered comparatively rich until the discovery of those of California and Australia. Borneo further contains the richest mines of antimony at present known to us, and although discovered only thirty years ago, they now furnish the main supply of Europe. The same island furnishes coal, a mineral far more important (if it be the old coal?) than any of the above, which is at present worked by English companies.*

The vegetable products of the Archipelago immediately useful to man are probably more various than those of any other quarter of the globe. It produces the larger portion of the spiceries consumed by mankind, and its volcanic region is eminently adapted to the culture of corn and pulses, of the sugar-cane and coffee. The present yearly produce of the last article, although an exotic, is estimated not to fall short of 25,000 tons.

In the department of zoology, I will only refer to its principal member, man. The inhabitants are of two distinct races, the Negro and the Malay, and each of these is divided into many sub-varieties, speaking as many different languages as the people occupying an equal extent of America. A curious and important fact, connected with the distribution of man over the Archipelago, is especially deserving of notice. By far the most numerous, and also the most civilised portion of the inhabitants, is found in the volcanic and smaller region. The entire number of the inhabitants has been computed

* On the S. side, coal is also worked by the Dutch.

at twenty millions, of whom no fewer than seventeen are in the volcanic region. Java alone, abounding in volcanic rocks, contains ten millions, or one half the population of the entire Archipelago. The two little volcanic islands of Bali and Lombok, of which the united area is but 3,300 square miles, have a computed population of 1,250,000, which is probably equal to that of non-volcanic Borneo, of eighty times their extent!

On the subject of the vast country which has thus been sketched, three papers have, as already stated, been read before the Society. The first of these, in importance, is that of Mr. A. R. Wallace, on the Arru, or Aroe Islands. This singular group lies towards the eastern extremity of the Malayan portion of the Archipelago, and is but 200 miles from the south-western coast of the great island of New Guinea, a comparatively shallow channel lying between. They are low islands, for the most part covered with forest, the larger being seven in number, and divided from each other by such narrow channels, that, but for the saltness of the water, the voyager might fancy himself in an ordinary navigable river.

The inhabitants are a quasi-negro people, but now considerably intermixed with Malays, Javanese, and natives of Celebes; some converted to the Christian, some to the Mahomedan religion, but some also continuing heathens. Of all the Oriental Negroes they are the most docile and industrious; being made so by their trading intercourse with strangers. Their sterile land will yield no human food except maize and yams, and they receive their rice from the more western islands of the Archipelago. An extensive bank, on the eastern side of the group, is productive in the mother-of-pearl oyster, in an inferior kind of pearl oyster, in the tripang, or holothurion, and in the shell tortoise; and the fishing of these is the chief employment of the natives. The Aroes are an emporium to which the western traders resort for the commodities now enumerated; while the islands themselves yield most of the birds of paradise, and the various parrots which, under the Malayan names, somewhat corrupted, of Lories and Cockatoos, are esteemed by distant nations.

The similarity or identity of the plants and animals of the Aroe group, man included, with the comparative narrowness and shallowness of the sea between them and New Guinea, has induced Mr. Wallace to come to the conclusion, that these smaller islands once formed part of the continental island. This is a matter which this enterprising traveller and accomplished naturalist will be better able to reason upon when he visits New Guinea, as he proposes.

Meanwhile, I would bring to your recollection that there has been read before us, by our Associate, Mr. John Yeats, an able paper on New Guinea, being a translation from the Dutch of Dr. Müller. That scientific traveller proceeded, in the quality of naturalist, with a Dutch expedition in the year 1835, and his account of the part of the great island which he saw is by far the best which has ever been given to the public.

The third paper is that of Lieutenant de Crespigny, R.N., who proceeded to Borneo, recommended to our distinguished Medallist Sir James Brooke by our late President, Admiral Beechey. Lieutenant de Crespigny gives, in a letter to our Secretary, an intelligent account of a river and country at the extreme northern end of Borneo, probably never seen, and certainly never before described, by an European.

Australia.—We cannot often expect to grasp so much fresh geographical knowledge respecting this vast country of British occupation as was laid before us last year by Gregory and his associates. Still, in respect to that portion of Northern or Tropical Australia in which that expedition first disembarked, and was for some time encamped, many interesting and new details have been produced by Mr. Wilson, the geologist, who has recently returned to England. Having had charge of the camp whilst Mr. Gregory made his first movement southward and ascertained the existence of a saline interior desert, this gentleman lost no opportunity of surveying accurately certain tracts around him, by scanning the nature of the rocks, the botanical products of the soil, and also by observing the natives and lower animals which inhabit the region watered by the Victoria and its affluents. His companion Dr. Ferdinand Mueller, the botanist of the expedition, who was also stationed in the camp of which Mr. Wilson had the charge, thus writes to me from Melbourne respecting him: "I feel it my duty to bear testimony that his exertions in the general duties of the expedition, whilst commanding at the main camp, were praiseworthy in the highest degree."*

After laying down the topography on maps, accompanied by pencil sketches, which give us a fair conception of the horizontal ridges of sandstone and trap rock with occasional limestone, the author estimates that there are tracts of not less than five millions of acres in extent, which, being covered by the richest grasses and

* I may also record the testimony of Mr. Humphrey, a volunteer attached to the expedition, in favour of Mr. Wilson.

well watered, are specially fitted for pasture, and therefore suitable for the permanent settlement of a civilized community. He also points out that no other part of Australia possesses so many navigable rivers as the northern seaboard, the Victoria having been ascended by the schooner *Tom Tough* to 100 miles above its mouth. Though necessarily hot, the climate is by no means injurious to European life, as proved by the fact that, although living there for nine months, the party did not lose a man, and scarcely any sickness prevailed. The thermometric tables kept from November to July indicate a range from 47° as a minimum to 106° as a maximum, with 84 days of rain. The grasses are described as so luxuriant as to grow from 6 to 10 or 12 feet in height; large timber is scarce, though smaller and other trees bearing fruit are not rare. Rice was found indigenous in one spot by Dr. Mueller, and in another by Mr. Wilson, who ascertained that it was eaten by the natives. Fish are plentiful, but kangaroos are scarce. Not now advertising further to the descriptions of various other animals, including the curious walking fish, and noting that the dingo or native dog is larger than in other parts of Australia, I revert with satisfaction to the ascertained healthiness of the country as well as to the fruitfulness of the soil to support the suggestion which I made many years ago, and again brought to your notice at the last Anniversary—that, whether by the establishment of a penal settlement or a free colony, North Australia ought unquestionably to be occupied without further delay.

On my own part I adhere to the opinion that, craving as we do any site to which we may transport felons (why not rebellious Sepoys?), there is no region on the globe which combines more advantages, with the gain of a high political object, than the north coast of Australia with its bays and streams. The convicts who might be first planted there, as I have previously shown, will be so completely cut off from all other parts of the seaboard of Australia which are occupied or can be occupied for a long time to come, as to prevent the escape of criminals. Now, as few persons will deny that it is of great importance that our maritime power in the Indian Archipelago should be sustained by having a port on the coast of North Australia as a refuge for our ships, and as a “point d’appui” for naval operations in case of war, so I trust that after colonizing the other sides of this continent, England will no longer abstain from unfurling her flag on its northern shores, whether by forced or free labour.

The reader who is interested in tracing the progress of discovery

in Australia will find a clear and well condensed historical review * of the same by Dr. Ferdinand Mueller, to whom I have already alluded, and to whose valuable labours due reference was made at our last Anniversary. Excluding from this summary all that relates to maritime survey, the author enumerates the explorers of the interior in the last 40 years, and indicates the amount of discovery made successively by Evans, Oxley, Allan Cunningham, Hume and Hovell, Sturt, Mitchell, Henty, Grey and Lushington, Strzelecki, Clark, Wickham and Stokes, Eyre, Leichhardt, and Kennedy. Dr. Mueller renders his article doubly valuable by giving in Mr. Gregory's own words a description of the physical geography of Western Australia, in which country that geographer was so long a resident. He further sketches with the pen of one well acquainted with the country the outline of his late journey from Tropical or Northern Australia, and brings together the various notices of recent journeys in South Australia, by Hack, Babbage, and certain settlers, and concludes that any rivers which would afford the means of penetrating far inland can nowhere be expected to exist (setting aside the mighty Murray and its tributaries), unless they be found between the FitzRoy River of North-West Australia and Shark Bay, a region where we have no settlement, and the coast of which has not yet been surveyed.

Colonel Gawler has also printed a little summary of geographical discoveries during 1857, to the west and north of Eyria in South Australia, to strengthen what he considers to be the evidence that the "country to the west of Lake Torrens is the true and practicable line of communication for rail and common road and electric telegraph between the south-eastern provinces of Australia, the great interior, Stokes's Victoria river, and the north-western coast in general." However incredulous I still am, as to the discovery of any considerable extent of really valuable country in the region to the north of Lake Torrens, or in finding habitable and rich oases in the great central portion of the continent, towards which the country seems to lower and become saline, and notwithstanding that I think Colonel Gawler's views too sanguine, it would ill become the President of this Society to damp the ardour of those researches by which alone the question can be permanently settled.

Mr. Hack has already laid open a band of country fitted for pasture, and furnished with supplies of water, which lies between the great saline tract of the seaboard explored by Eyre, and the

* Read before the *Institute* of Melbourne, 25th Nov., 1857.

equally saline region on the north as made known to us by Sturt. Now, although this belt may possibly serve as a line of traffic between South and West Australia, it yet remains to be proved if, by surmounting the natural obstacles and want of water on the north, experienced by Sturt, it be practicable to reach beyond the saline desert in that direction, or find in the centre of Australia, any oases of good land supplied with natural springs. Mr. Herschel Babbage, who had distinguished himself by a former survey in South Australia, is now determining the question. This gentleman has recently explained to the Philosophical Society of Adelaide the detailed manner in which he hoped to carry out his survey; and I am happy to say that his project is devised with the mathematical precision and accuracy of delineation, whether as regards the instruments he was to use, or the methods by which he hoped to overcome the obstacles opposed to him, which are well worthy of the son of our eminent mechanical philosopher.

When we reflect upon the arduous task to be accomplished, and the incessant labour of extracting fresh water from salt throughout so vast a breadth of saline country as the party must traverse to reach any portion of the expected land of promise, we cannot too much admire the devotion and skilful appliances with which such difficulties are to be overcome. A cheering vista has indeed been suggested in the reports that cattle have migrated from the north, where they must have pastured: but whether this should prove to be well founded or not, whether the colonists may be gratified by the discovery of a rich interior, which we must all heartily wish for, or depressed by ascertaining the positive continuation of a saline desert northwards, geographical science must gain curious additions by this arduous enterprise.

Gold produce of Victoria.—As fourteen years have elapsed since I first addressed you on the rocks of Australia, which were destined to prove auriferous, and as I have in subsequent years, including our last Anniversary, adverted to the produce of gold, it may be expected that I should say a few more words on the subject, particularly in relation to the highly productive colony of Victoria. Mr. Selwyn, a distinguished élève of the Geological Survey of Britain, and Professor M^cCoy, the well-known palæontologist, have now completely set the geological features of the case at rest, and have demonstrated that the principal auriferous quartz veins (or those from which all the productive gold shingle or gravel has been derived) occur in slaty rocks of Lower Silurian age, as proved by

their imbedded organic remains. These veinstones (the reefs of the miner), which are rarely more than a foot or two in width, have here and there yielded a good deal of gold near the surface, and hence numerous shafts have been imprudently sunk deep into them. Many of the operators have already found to their cost that these sinkings are profitless, either by the diminution of the ore or by the expense and difficulty of extracting it. In truth, the result, as far as the present trials go, seems to justify my former inferences as based upon the experience gained in other gold bearing countries. The report of the mining companies of Victoria is to the effect that already ten of the shafts which had been sunk into the solid rock had been abandoned, and that enough had been already done to vindicate the old scientific inference, that in a general sense (though there are exceptional cases) deep mining for gold in quartz rock is profitless.

Very different, however, is the produce derivable from the auriferous débris. For, although many of the old diggings have, as I anticipated, also been exhausted, or the materials which filled the natural troughs and depressions worked out, Mr. Selwyn points to considerable tracts of country over which such auriferous débris will yet be found to extend, whilst he regrets that he is unable to define the probable range and limits of such detritus from the want of any accurate geographical maps. In reference to all the yet unexplored tracts through which it is believed the gold detritus may extend, the geological surveyor naturally calls for the same sort of detailed map as that which represents the gold bearing region near Mount Alexander as trigonometrically surveyed by Mr. W. S. Urquhart, and brought out by Mr. Arrowsmith on the scale of 3 inches to 2 miles.

Referring you to what I said last year respecting the time which may possibly elapse before all the gold shall cease to be profitably extracted from the rich heaps which are more bountifully spread out in Victoria Land than in any known part of the world, I repeat my conviction that, whether in a quarter of a century or more, the period will soon be roughly and approximately estimated (*i.e.* so soon as the geologist is furnished with good maps) when the exhaustion of the *great* produce of Victoria shall take place. Whether the existing causes of the decline in produce, including a deficiency of water for the works, be or be not of a temporary nature, it is a matter of fact that the amount of the past year has been below the average of the preceding years.

AFRICA.

Livingstone, or Zambesi Expedition.—As few events have reflected greater credit on the British nation than their warm and affectionate reception of the good and noble minded Livingstone when he emerged after so many struggles from the heart of Southern Africa, so it is most gratifying to every friend and admirer of that excellent man to know that the produce of his pen as a record of those travels has had so great a sale as to ensure a competency for his wife and children. The 30,000 or 40,000 copies of his remarkable volume, which the public eagerly bought, constitute the real monument which the author has raised for himself!

When I lately presided at the great festival held to wish him and his associates God speed, and dilated upon their prospect of success, I endeavoured at the same time to moderate the over sanguine expectations of the mercantile portion of the public in reference to the trade which might speedily be opened out with these regions.*

It is also well to bear in mind that there are difficulties to be surmounted even in the ascent of the Zambesi, of which persons unacquainted with the oscillatory nature of African rivers must be informed. Thus, Mr. M'Queen, our sagacious critic on all South African subjects, writes to me, that when the celebrated Portuguese traveller Lacerda † ascended the Zambesi in 1798, and when it was in full flood, he found that for spaces of 9 or 10 miles the stream had a depth of 3 feet 4 inches only; the current being so rapid that he was obliged to unload his small boats and transport his baggage by land. We must, therefore, be prepared to hear of similar obstacles to navigation in Livingstone's case; but let us hope that they are now in the very act of being overcome by the forethought and enterprise of a leader in whom we have every confidence, supported as he is by a naval officer, Commander Bedingfeld, of great experience in the navigation of African rivers, and heartily sustained by associates, each of whom is thoroughly adapted to effect the special object of his mission,‡ whilst all of them are sincerely attached to their undaunted and sagacious chief.

* See Proceedings, vol. ii., p. 116.

† Lacerda's Journals of the Expedition to Cazembe were published at Lisbon in the 'Annaes Maritimos' for 1844, and are in our Library.

‡ The other officers in addition to Commander Bedingfeld are Mr. C. Livingstone, secretary and superintendent; Dr. J. Kirk, surgeon and naturalist; Mr. R. Thornton, mining geologist; and Mr. T. Baines, artist and storekeeper.

Niger Expedition.—In reference to the Niger, or Quorra, I have been further reminded by Mr. M^cQueen that both Clapperton and Lander have left behind records that the river for some distance both below and above Boussa, if not unnavigable, owing to rocks and rapids, is probably useless as a highway for any trading purpose. In the days, however, of those explorers, steam had not been applied in the ascent of African rivers; and although too great a confidence in that power may have led to the dilemma by which the *Day Spring* was wrecked, we have the satisfaction of knowing that, although the party lost their papers and collections, and saved barely provisions and articles of barter enough to support themselves, and possibly to effect the main object of the expedition, still it was supposed that the persevering and able commander, Dr. Baikie, might succeed in establishing an intercourse with the Sultan of Sokato. At the same time the arrival of another steamer, the *Sunbeam*, which has been so speedily equipped by Mr. Macgregor Laird, will soon restore the confidence in our resources with which it is sought to impress the native chiefs.

We must, however, bear in mind that attempts to navigate unsurveyed tropical (African) rivers must be attended with danger, owing to the great oscillations in their depths between the periods of high flood and those of the dry season.

In thus briefly alluding to the Niger Expedition, of which I still hope to announce good results at our next Anniversary, it is gratifying to know that one favourable circumstance has already arisen out of their effort, in the establishment, by our Associate, Mr. May, of a direct and undisturbed line of transit between Boussa and our great establishment of Lagos, on the coast, which promises to be of high importance in securing our intercourse with Central Africa.

Congo, &c.—The Congo was ascended in the beginning of last year by Commanders Hunt and Moresby, R.N., who, after great exertion in tracking their boats against the powerful current, were finally brought to a standstill by what they consider to have been the cataracts of Yallila, four days above Embona.

The river was broad and uninteresting for the first 70 miles, as far as Embona; but immediately beyond that place the nature of the country it flowed through underwent a complete change, and high hills, diversified scenery, and luxuriant vegetation began to appear. The current increased in rapidity, until at the farthest point reached by the party the Congo poured its whole stream between two promontories only 250 yards apart, roaring and rushing with fearful

violence, and forming immense breakers and dangerous whirlpools, such as no vessel could possibly live through. Commander Moresby considers that a steamer of light draught would have no difficulty in ascending up to this point, which must, I suggest, prove to be of high interest to the geological explorer, who will probably meet near the cataracts of Yallila with the same hard and crystalline axis of the country as occurs in a more northern parallel at Boussa, on the Niger or Quorra.

A short journey has been made by Dr. Bastian in the province of Congo, preparatory, it is believed, to a future and a more extended exploration. Many valuable facts relating to the tribes of the interior are said to have been collected by him.

On consulting with our African Medallist and one of our Hon. Secretaries, Mr. Francis Galton, I find his opinion to be that there is no direction in which an explorer could travel by which he might add more to our knowledge of Africa than by starting from one of the seaboard towns of its south-west coast, such as Loando, and journeying thence in a north-easterly direction as far as circumstances would permit, and as near as possible to the eastern countries now being explored by Captain Burton. Every step in such an expedition would, I admit, be a distinct gain, and serve in a remarkable manner to lay bare the vast remaining tracts of the terra incognita of Africa.

Central Africa.—The preceding observations, and those which I offered to you at the last Anniversary in reference to the great difficulties which Dr. Barth had surmounted, naturally lead me to speak of the two concluding volumes of the work of this great African traveller, which are just issuing to the public. These volumes narrate his proceedings subsequent to the death of Dr. Overweg, on the borders of Lake Chad, and include the most interesting part of his entire journey and his sojourn at Timbuctu. In addition to his 'Travels,' Dr. Barth has delivered lectures before the British Association (at Dublin) on the Hydrography of the Niger, before the Asiatic Society on the Ethnology of the Berber (Tuarick) race, and at the last meeting of this Society he gave us an epitome of the physical and social geography of Northern Africa, in the construction of which he made ample use of the labours of African geographers, in a sound knowledge of whose works there are few who rival him.

It will be obvious, from the nature of Dr. Barth's investigations, that it is perfectly impossible for me to condense his results into a

few paragraphs. The main physical features of the land he travelled in, and the principal geographical discoveries of himself and his coadjutors, are already known to us, and are incorporated into the popular geography of the day ; as, for example, the desert plateaux with their Alpine oases, the upper course of the Chadda-Benué, and the vast lagoons and floods of these central equatorial regions. For the rest, we are furnished with such a multiplicity of independent details, that broad, general views, calculated to convey a correct, though cursory knowledge of his labours in Northern Africa, can with difficulty be embraced on this occasion. He deals with ten or twelve distinct races, each unlike the rest in features, customs, and languages. We have to consider them as distributed into about as many nations, but in such a manner that the boundaries of their territories by no means coincide with the boundaries of the races ; and, in addition to this entanglement, we find large settlements or colonies of Fellatahs and of Tuaricks dispersed about the country, bearing relations of a most diverse and anomalous character, both to the government of the land they inhabit, and to that whence they migrated.

The physical features of North Africa are equally various : a fertile band lies adjacent to the Mediterranean ; then comes a desert, studded with oases ; and, lastly, by a more or less gradual transition southwards, the scene is utterly changed, and an excessive drought and barrenness give place to the very opposite extreme of humidity and equatorial vegetation. Where, then, the kingdoms do not correspond with the races, and neither of them with the physical features of the soil ; where the state of society is in a constant flux of warfare and change, leaving few records of its transitions (and those of the most meagre description, dating back some to the times of the Roman empire, and others to the 10th, 12th, and 14th centuries), it is easy to conceive that a geographer like Barth, whose line of inquiry is eminently historical and social, and who is remarkable for the patient accumulative industry of his countrymen the Germans, should have gathered a mass of matter which his voluminous publications appear insufficient to exhaust, and to which it is totally beyond my power to do justice in this Address. I am, however, convinced that there is no method of epitomising his labours so convenient as that of displaying them upon large maps, variously shaded and tinted, to show the races, nations, population, physical features of the country, and so forth ; such as those that were submitted by him at our last evening meeting. Those maps

and his accompanying memoir will, I trust, be hereafter published in the Society's 'Journal,' and it must be to them, rather than to any description of my own, even when aided as I have been by the study of Mr. Galton, that I beg to refer all those readers who desire to learn the nature and the extent of our gains in African geography due to the indefatigable industry of our medallist, Dr. Barth.

Cape of Good Hope.—A careful survey of the lower course of the Orange River has been made by our Associate, Mr. Moffat, the son of the well-known missionary, and the brother-in-law of Dr. Livingstone, under circumstances of difficulty, owing to the exceedingly desolate nature of the country through which that river runs. His paper is of interest, not only as an accession to the descriptive geography of an almost unknown region, or as delineating the northern boundary of our colony, but also as throwing light on the general physical geography and geology of that part of Southern Africa.

Ovampo.—The country of the Ovampo, first reached by Messrs. Galton and Andersson, has again been visited by a party whose expedition ended disastrously. Two of the missionaries of Damara Land, accompanied by Mr. Green and a party of 30 Damaras, had hoped to cross Ovampo Land and to reach the river Cunene. The king of the Ovampo offered them hospitality, but on their arrival, for some unexplained cause, he peremptorily refused them passage, and when they had made ready to return, the population rose en masse, attacked them, and killed one of their attendants. After half a day's defence, in which many of the Ovampo were killed, the party had the good fortune to escape unharmed into the wilderness, and after three days and two nights of forced marches reached a watering-place, and thence made their way back to Damara Land. The route of the travellers was parallel to that of Mr. Galton, and many geographical features were discovered, including a small lake, but the detailed account of their observations has not yet reached us.

Mr. Andersson, the Swedish explorer, to whom we gave one of our honours in 1854, has announced his intention of himself travelling to the Cunene River, and he probably started on his expedition from Walfisch Bay in the beginning of this year. Although he describes himself as very inadequately equipped, we must hope that his long familiarity with South African travel will compensate for other deficiencies.

Senegambia.—The districts adjoining the Senegal are becoming far better known to Europe than they have been hitherto. The French at St. Louis, dissatisfied with their position of dependence upon the

capricious good will of the native chiefs, have made vigorous efforts to secure to themselves an open navigation of the river, respect to their flag, and cession of land for settlements along its course. Much information has been gained in consequence of their exertions; and interesting communications upon Senegambia appear frequently in the 'Revue Coloniale,' a monthly periodical, to which I would direct the attention of those who follow with interest the progress of civilisation in Western Africa, or who may desire to inform themselves upon French colonial interests in general.

Mozambique.—In turning to the east coast of Africa, let me say that Mr. M'Leod, our newly-appointed consul at the Portuguese settlement of Mozambique, is proving himself to be of great service both to his country and to the cause of science. In a letter, dated December 14th, he informs me that he had called the attention of our Government to the great advantages of establishing a steam-postal communication between Aden and the Cape of Good Hope, showing how much time would be saved thereby in comparison with the present line. This subject would have been brought under your consideration, had I not reason to believe that the expenses already incurred in establishing and maintaining the present line of communication are considered too great, on the part of the Treasury, to permit a new large outlay.

Again, in the suppression of illicit measures for carrying on the slave trade, under the name of *Free* Emigration, but which is frequently a mere guise for a real trade in slaves, Mr. Lyons M'Leod, who is exerting himself with energy, gives great praise to the present Portuguese Governor-General of Mozambique, who, despite one-sided judges and the old habits of the colonists, is determined to carry out the sentiments conveyed to the British public, at the Farewell Dinner to Livingstone, by Count Lavradio, the enlightened representative of the King of Portugal, in relation to the extinction of that detestable traffic.

Mr. M'Leod has also communicated to me a rough Portuguese chart, or rather two plans, of the river Zambesi, which, if it had arrived somewhat sooner, might have been really serviceable to Livingstone and his associates. Major Sicard, the Governor of Tete, had promised Mr. M'Leod further information respecting the Zambesi, and also plans of that part of the country where the coal-mines are situated, with a description of the launches now used in conveying the mineral to Tete, the mode of obtaining it, &c. From the same source, our active Consul was also gathering information con-

cerning the medicinal plants of the banks of the Zambesi. He has further written to the Chamber of Commerce of Manchester, informing them that the cotton shrub grows close to his house on the mainland, opposite Mozambique, and that he has already stimulated some of the influential residents to clear a considerable space of ground for its cultivation. As the climate and soil are peculiarly favourable to the culture of the cotton plant, he requests that seeds of the three well-known varieties should be sent to him, in which case he proposes to send the "Nankin" and "Green seed" varieties up the Zambesi, and far into the interior, and to reserve the "sea-island cotton" for culture on the coast; the sandy soil being better adapted for this variety, the growth of which would be favoured by the saline breezes of Mozambique.

In pursuing researches like these, and in thus preparing the way for the great improvement of South-Eastern Africa, which the mission of Livingstone is to carry further out, it is refreshing to find our Consul so zealously and cordially aided by the Governor-General of Mozambique, not only in all objects tending to the suppression of the slave-trade, the improvement of commerce, and the increase of material prosperity, but also in many scientific researches. Among these may be numbered a series of observations on the currents of the Mozambique Channel, for the determination of which the Consul has prepared a thousand copies of a printed circular, with explanations in four languages, which he delivers to captains of vessels sailing to the Mauritius, Port Natal, the Cape, Zanzibar, Johanna, and Bombay, whilst the Port Captain furnishes him with extracts of the logs of the vessels arriving—so collecting materials for wind and current charts, on the plan of Lieut. Maury. When I add that Mr. Lyons M'Leod is keeping a meteorological register on the mainland, whilst the Governor-General keeps one on the island of Mozambique, and that he has steadily made magnetic observations, you will all agree with me that our Associate is a person well qualified, by his energy and capacity, to extend the benefits of commerce, science, and civilisation on the East Coast of Africa.

I am not indeed without hopes that the range of the usefulness of this active Consul may be extended along the East Coast; and that, seeing the importance of establishing regular communication and intercourse between Natal on the south, and the rich Somauli provinces of the Inaam of Muscat on the north, our merchants may drive an extensive and lucrative trade, a considerable part of which,

let us hope, will be furnished from the Zambesi, and out of territories now about to be explored by Livingstone and his comrades.

Expedition from Zanzibar and Mombas into Eastern Africa.—Captain Burton and his colleague, Captain Speke, have now fairly set to work upon their great expedition into Eastern Africa. When they first arrived at Zanzibar many circumstances concurred to recommend a preparatory trip, and the party travelled from Mombas as far as Fuga, following the course of the Pangány river. The setting in of the rains made further progress impossible, and no new information was acquired by Captain Burton upon the white-capped mountains of Kilimandjáro and Kenia. Having partly recovered from the severe acclimatising fever (which no traveller from the Zanzibar coast can avoid, and which had totally prostrated the members of the expedition), the rains having subsided, and porters, asses, guides, with an escort having been procured, Captain Burton sailed with his numerous party from Zanzibar to Baga Moyo, and at once started for the interior. Two communications have reached us relating his further progress; the last of them was dated Sept. 6th, S. lat. $6^{\circ} 40'$, and E. long. $35^{\circ} 40'$, or at a distance of about 200 geographical miles from the sea coast in a direct line. These communications consist chiefly of route maps by Captain Speke, on a large scale, together with numerous observations for latitude and elevation.

On leaving Baga Moyo the party proceeded up the Pangány river to a distance of 120 geographical miles from the sea-coast, passing over an extremely luxuriant country, very level, and abundantly cultivated, but apparently, like other great alluvial or delta accumulations on the immediate sea-board of Africa, pestilential to European constitutions. At about E. long. $36^{\circ} 50'$ a hilly district was reached, which proved to be the face of a vast elevated tract, gradually sloping upwards towards the interior. At the point whence we last heard from Captain Burton the land had attained an altitude exceeding 2000 feet, and a still more elevated country was before him.

It will be of extreme interest when Captain Burton's report of the geology of the country shall reach us; for even the facts stated seem to bear out the opinion I advanced from this chair at the Anniversary Meeting of 1852, and which the subsequent discoveries of Livingstone corroborated in a satisfactory manner, namely, that South Africa certainly, and the whole of the continent

probably, is a vast trough or basin, encircled on all sides by higher ridges.* It will be recollected how I then showed, that these ridges, wherever we had certain knowledge of them, consisted of primeval or palæozoic rock, for the most part crystalline—that they enclosed fresh-water deposits of younger age, and lacustrine character; and, therefore, that the main physical features of modern Africa, such as I have described them to be, are those which have continued to characterise that continent from the earlier geological epochs down to the present day.

My hearers will also recollect that, justified by the discoveries of Livingstone, I took occasion, at our last Anniversary, to throw great doubts on the existence of snow-capped mountains in these equatorial latitudes. As far as they have gone, the observations of Burton's party throw no new light on that hypothesis; and it still remains to be determined whether or no the Nile, like the Zambesi, Congo, and Niger, has its chief sources in the great watery interior plateau. (*See Ann. Address, 1857, p. clxx.*)†

* *See also Dr. Livingstone's Cambridge Lectures, with a Prefatory Letter by Professor Sedgwick. Edited by the Rev. Wm. Monk, &c.; with map by Arrowsmith, granted especially by the President and Council of the Royal Geographical Society.*

† Whilst these pages are passing through the press, accounts have been received informing us that Captains Burton and Speke had penetrated westwards to near 500 miles from the coast, according to their dead reckoning. They had passed from the Ugogo country, through the Mkali Mgumbu wilderness, had crossed the frontier of the Waniemesi, and they wrote from a place, Unianembe, 70 miles beyond it. The boundaries of the different tribes, and the physical features of the country, so far as our travellers have gone, correspond very closely to the description given of them by the Rev. Mr. Erhardt, who drew his information entirely from native testimony. It will be recollected, that a short account of his memoir, and an accompanying sketch map, were published in the first number of our Proceedings, and, if reference be made to the latter, the point on the line of route whence we have received our latest intelligence will be found to be that which is intersected by the 34th parallel of longitude. Capt. Speke places the real position of the station in question in lat. 5° 2', and considerably to the westward of that point. The doubts which I ventured to throw out in the Address of last year, respecting the existence of lofty snow-covered African mountains under the Equator whence the Nile flows, and the theoretical view (founded on the observations of Livingstone) which was then propounded, of the origin of great periodical floods by the bursting and overflow of large marshy tracts of Central Africa, might, at first sight, seem to receive some confirmation from the researches and writings of the ancients. My accomplished friend Sir Henry Holland has directed my attention to certain pages of Seneca (*Nat. Quæst., lib. vi.*), in which that author describes his having conversed with two centurions, who, in the early part of the reign of Nero, had been sent to seek out the sources of the Nile. With the assistance of the King of Ethiopia and other chiefs, they had to so great an extent accomplished their task, that further progress by water was impracticable, for they reached great jungles or marshes (*immensus paludes*) in which the smallest canoe, containing one man only, could paddle. As, however, Seneca speaks also of waters gushing from subterraneous reservoirs as probable sources of the Nile, other geographical friends, who were aware of these writings, do not believe that they are to be viewed as trustworthy accounts of the origin of the great river.

A map of the region to the north of Abyssinia, between 35° 37' long. E. of Paris, and 15° 17' N. lat., drawn upon the ground in 1857 by Mr. Werner Münzinger, has been published at Winterthur in Switzerland. Besides the small German work of Heuglin, to which allusion was made p. 284, when the merits of the old descriptions of Bruce were

PHYSICAL GEOGRAPHY.

Changes of the Surface of the Globe.—Having gone through a variety of details respecting the progress of our science in the four quarters of the globe, I may now draw towards the end of this Address by a few notes on the general and important subject of *Physical Geography*.

M. de Francq has recently occupied himself with some laborious researches respecting the laws which may be recognized in the distribution of land and sea, and of surfaces of relative elevation and depression on the general outline of the globe. Assuming the whole mass of the earth to have been primitively in a state of fusion, and an outer crust to have been formed by cooling and consequent solidification, he concludes that when this process had arrived at a certain stage, the *shrinkage* of the interior nucleus from continual loss of heat would be greater than that of the outer crust from the same cause, and that consequently the solid superincumbent crust would partly lose its support beneath, and be left in the position of an arch or dome too weak to support itself. The result, it is supposed, would be that the shell would collapse by its own weight, and that its surface would be elevated into ridges and depressed into furrows in various directions, producing the inequalities which we now witness. In this idea there is nothing new; but M. de Francq has another assumed principle which forms the base of his very laborious researches. He assumes *that the effect of this partial crushing of the earth's solid crust will manifest itself equally along every great circle of the globe*—a result which he pointed out to myself on a small hollow globe of thin flexible substance when affected by the tightening of strings which draw it into depressions which are accompanied by parallel depressions. It might perhaps be supposed that this effect on any proposed great arc would be

brought out, the literature of researches in Abyssinia has received in the past year a copious and instructive addition by the publication at Rome, through the Propaganda Congregation, of the work entitled 'Viaggio e Missione Cattolica fra i Mensa, i Bogos e gli Habab,' by the missionary Giuseppe Sapeto. First visiting Abyssinia in company with the brothers d'Abbadie in 1838, and quitting it from bad health after a sojourn of five years, Sapeto made his last journey from Massowah in 1851. His personal adventures, which are told with great animation, form a part only of the contents of this well-filled volume, in which the author has amassed much valuable information respecting the physical geography, ancient divisions, and general history of this country, so gifted by nature, and now in so fallen a state, accompanied by striking sketches of its animal and vegetable productions. He has further added annotations from national documents in the Ethiopian language, with translations into Italian. I am indebted to my friend Dean Milman for an acquaintance with this work, which I had not seen when the Address was delivered, and which is well worthy of perusal by geographers and scholars.—June 30, 1858.

properly measured by the *vertical* extent of elevation or depression combined with the *horizontal* extent along the great circle. M. de Francq, however, has taken only the linear horizontal extent as the measure in question. It is for the natural philosopher and the geologist, rather than for the geographer, to pronounce on the soundness of the physical views on which these researches are founded; but the facts respecting the distribution of land and sea, of mountains, plains, and rivers, with which these investigations may make us acquainted, as well as the laws according to which they may be grouped and classified, are equally interesting to the geographer, whatever may be the physical principles on which such researches are professedly founded.

It would be impossible for me to enter into any detailed analysis of the examinations which M. de Francq has made of the phenomena along an immense number of great circles. I can offer but the briefest outline of them. In order to render the investigation as impartial as possible, he has fixed upon eight equidistant points on the Equator, beginning with the meridian of Paris. He takes through each of these points 36 great circles equidistant by 5° from each other, thus forming *four* systems (*roses*) of divergent great circles, each system passing through two opposite points of the eight above mentioned. He then examines the horizontal extent, along each great circle, of the lines of elevation (*arcs d'enhancement*); along the remaining portion of the circle there will generally, of course, be depression. All dry land is considered as belonging to *elevation*, but the whole bed of the ocean is not regarded as belonging to *depression*; for lines along shallow coasts, ranges of islands, &c., which are only slightly and partially immersed beneath the surface of the sea, are also regarded as *lines of elevation*, being supposed in fact to lie above a certain mean surface, to which elevation and depression are referred. Moreover, these great circles frequently pass across regions which are nearly or altogether unknown, in which case he calculates the lengths of the lines of elevation in such regions on the supposition of their being proportional to the lengths of similar lines along the known portion of the great circle, and adopts these calculated lengths as the most probable lengths of the unknown lines in question. Proceeding on these suppositions, he finds (1) that on all those great circles along which the lines of elevation defined by the existence of dry land form together an arc of less than about 100° , there exist submarine lines of elevation, which, together with the terrestrial ones and those which are as-

sumed to exist in the unknown regions traversed by any great circle, make up very nearly the amount just mentioned of 100° ; and moreover, that all such great circles are each characterized by very nearly the same number of transverse lines (*alignements terrestres*) which run perpendicularly to the great circle, and are marked by salient points of the earth's surface, or are recognised as lines of volcanic action, or lines along which, at least, earthquakes are not of unfrequent occurrence. M. de Francq also finds (2) that those great circles along which the terrestrial lines of elevation constitute together an arc of more than about 100° are not accompanied by the transverse *alignements terrestres*, but by others which are parallel to their own directions respectively. These appear to be two of the principal generalizations at which M. de Francq has arrived respecting the existing geographical distribution of land and sea; and one of the most interesting deductions from them may, perhaps, be stated to be that which he draws respecting the probable existence of considerable tracts of land in the polar regions. He finds that those great circles of the first class above mentioned which traverse the polar regions are most defective in the extent of their *known* lines of elevation, but the whole arc above mentioned of 100° is made up in such cases by the calculated probable extent of such lines in the *unknown* polar regions. The harmony thus established between the great circles which traverse the polar regions, and those which lie without them, is regarded by M. de Francq as a proof of the truth of the hypothesis that a considerable extent of land exists in the neighbourhood of one or both the poles of our globe.

One of the great objects of my intelligent and indefatigable friend the Baron de Francq in publishing the ingenious memoirs* which he has successively laid before the French Academy of Sciences, the application of his theory to some of the great geological features of the globe, as specially indicated in the last of these communications, cannot now be adequately discussed. The consideration of this vast subject, on which the eminent geologist Elie de Beaumont has written so ingeniously in propounding views which M. de Francq supports, would occupy in fact a large part of a purely geological discourse. The physical data, however, which the author has arranged and discussed with great perspicuity and infinite pains, in-

* De la Formation et de la Répartition des Reliefs Terrestres, Mém. de l'Académie des Sciences, 28 Fév., 24 Mars, 2 Juin, 1856, et 15 Mars, 1858. See also Bull. de la Soc. Géol. de France, 2 sér., t. x., 1853.

volve questions of high importance to every one who speculates upon the causes which have operated in producing the chains of mountains, and corresponding depressions of the earth's surface.

Movement of Waves.—An original view of the undulatory movements of the sea and its currents has been published at Rome * by Commander Cialdi, of the Pontifical marine service, author of various other works of merit on analogous subjects.† It is out of my sphere to judge the merits of the work of this ingenious author, who, whilst I write, has visited London, to conduct to the Tiber two small steamboats; but I may briefly say, that after an elaborate detail of facts, drawn from the writings of a multitude of mariners, engineers, geologists, and others, to the number of nearly two hundred, and also citing his own long experience when in the Sardinian navy, he endeavours to counteract by such data the prevalent theory of eminent mathematicians, which does not admit of any real motion of transport in the molecules which constitute a wave, nor the power of waves at great depths. To give my hearers some idea of the main object of a work which has been highly commended by the Accademia dei Nuovi Leicei of Rome, as well as by the Academy of Venice, I here cite the author's own words, as conveying his main views:—

“I am convinced,” says Cialdi, “that the real motion of translation (or driving movement) in an undulating mass of water always exists during violent winds and storms, whatever be the depth of the sea; and that it also obtains in moderate weather, but only where the inferior, the lateral, or the frontal development of the wave finds an obstacle, at any distance whatever from the shore. I also maintain that the motion communicates itself to the whole mass that constitutes the wave, when the latter cannot develop itself; and that the intensity of the motion is greatest at the bottom of the sea, and least on the surface, when the depth of water is relatively small, and when the wave is not broken. I further maintain that the effects of this motion are more or less perceptible according to the nature and form of the obstacle, the volume of the undulating mass, and the velocity of its propagation. Moreover, these effects must prove very complicated, and produce all the varied series of powerful phenomena that we observe on abrupt coasts, piers, breakwaters, and shelving shores.”

* ‘Cenni sul Moto Ondoso del Mare e sulle Correnti di esso, 1856.’

† ‘Studi Idrodinamici Nautici e Commerciali, Roma, 1845;’ ‘Sul Tevere e la Unione dei due Mari, Roma, 1847;’ ‘Studi sur Porto di Livorno, Firenze, 1853.’

Current Charts.—Mr. A. G. Findlay has constructed an excellent chart of the North Atlantic Ocean, on four sheets, which embodies in a condensed form the results given in the extensive series of charts published by the American Bureau of Hydrography, as well as other authorities. This chart, intended for the use of sailors, will show the connexion between the different branches of the meteorology of the sea, the similarity between the circulation of the air and water over its area, and their effects on the temperature in different seasons. Among the results it appears that the great mass of waters takes about one year to travel from the Bay of Biscay to the Gulf of Mexico, while the more rapid circulation of the smaller volume from the Mexican Gulf, by the Gulf-stream, occupies about eight months in reaching the shores of Europe. These periods, derived from a careful calculation of all attainable observations, accord very closely with that of the drift of bottles, a collection of which, made by Capt. Becher, R.N., shows that the currents are not so rapid as has been usually considered.

The Gulf-stream ceases to be a marked current after passing eastward of the Newfoundland Banks; its warm waters are then drifted to the east and north-east by the prevailing south-west and west winds, by which cause its effects are propagated to Britain and the coast of Norway.

In 1838 Mr. W. C. Redfield propounded the theory, that the Arctic currents, after passing over the Banks of Newfoundland, flowed beneath the Gulf-stream to the southward and south-westward—a theory which has been confirmed by American navigators, who have found that at a depth of 370 fathoms, or bed of the Gulf-stream, in its narrowest and warmest part, the temperature is at zero. This remarkable and exceptional phenomenon does not, however, extend eastward of 46° W. meridian; for Commander Dayman found in that longitude that the water had a temperature of 39°·7,* at a depth of 1000 fathoms, in two instances, showing a remarkable contrast in so small a distance.

The Arctic current had been considered to be lost at Cape Hatteras, in its south-west course; but the cold bands which have been observed by the American surveyors to exist in the Gulf-stream must be derived from this source. There is another curious subject for consideration—the peculiar configuration of the coast of the

* 39°·5° is the temperature assumed by Sir Jas. Ross as that at which sea-water has its maximum density.—*Voyage to the South Pole*, ii. 156, 375, 384.

United States between Cape Hatteras and Cape Fear. These, as Mr. Findlay has suggested to me, may be the result of the conflicting hot and cold currents there neutralising each other, and producing those long sand ridges projecting transversely to the direction of the two streams from Cape Hatteras, Cape Fear, and Cape Lookout, which promontories are separated by long sweeps of low diluvial shores. This reasoning is indeed sustained by another fact, evident on a close examination of Maury's thermal charts, viz., that the Arctic current, or other very cold water, flows to the south-east from off these capes to the southward of the Bermuda Isles.

Deep-Sea Soundings—Geological Analogies—Atlantic Telegraph.—At our last Anniversary your attention was riveted to the great project of establishing a communication between Britain and America, and the preparations for carrying out that noble project. Among these I announced that the paddle-wheel steam-frigate the *Cyclops* had preceded the *Agamemnon*, and that steps had been taken by the Admiralty to secure for naturalists all the materials, whether animal or vegetable, which might be brought up from the sea bottom. This object has been efficiently carried out across the North Atlantic, between Valentia in Ireland and the coast of Newfoundland, the methods employed, and the results, having been clearly reported by the commander of the vessel, Lieut. Dayman. The apparatus employed was a modification of that invented by Mr. Brooke, of the United States Navy, and the results have unquestionably given us a much more extended knowledge of the bed of the Atlantic, and of the temperatures and densities of its waters, than were ever before obtained, thanks to the excellent conduct of the officers and men employed.

Referring to the printed Report for many instructive data respecting the meteorology of the ocean, I will now briefly allude to the support which has been given to geological science by the operations of the officers of the *Cyclops*. The submarine section, which is given at the bottom of Plate 1 of the Report, teaches us, as before said, that, in the 15° of W. long., or about 180 miles from the shore of Ireland, the plumb-line suddenly descends from 550 to 1750 fathoms. This wall of 1200 fathoms in height suggests the idea of one of those former movements by which the crust of the earth has been broken through by a long and deep fissure or sudden disruption. Another feature of great geological interest is, that having once quitted the comparatively shallow water on the coast of Ireland,

all the soundings, twenty-six in number, which were made in crossing the deep ocean, or between the 15° and 45° of W. long., with two exceptions, when stones and shingle were met with, have proved that the bottom, whether at the maximum depth of 2424 fathoms, or of 954 fathoms on nearing the shores of Newfoundland, is composed of a soft mealy substance, to which Captain Dayman gives the name of ooze.

Now it was a point of great interest to the geologist (one in which I took some personal interest before the expedition sailed, by communicating with Captain Washington, the Hydrographer) to collect any organic bodies brought up from these extreme depths. At my request, indeed, Professor Huxley drew up instructions for the proper preservation of any such objects, which were carefully carried out by Commander Dayman and Dr. Gimlett, the medical officer of the expedition. The specimens of ooze, which have been examined by Professor Huxley, of the Government School of Mines, have led him to believe that nine-tenths of this fine muddy deposit consist of the minute animal organisms called Foraminifera, composed of carbonate of lime, and that 85 per cent. of these are referable to the genus *Globigerina*, in all its various and multiform stages of growth.

Great as is the interest attached to the question, of whence this infinite quantity of these small creatures, mixed with some other Foraminifera, is derived, Professor Huxley does not pretend as yet to be capable of answering it entirely; but, knowing that highly organised animals can live at depths of 300 or 400 fathoms, he is disposed to think that these vastly humbler creatures may have existed at the great depths from whence they are dredged up. Now this ooze, or fine marine mud, not a little resembles our chalk, which also contains the same genus *Globigerina*; and just as the chalk has similar persistent characters, from the cliffs of Albion to Orenburg in Russia,* so this submarine ooze maintains the same aspect and composition over a nearly equal breadth between Britain and America.

Let us hope that, when our Admiralty again decides upon obtaining a systematic series of deep sea soundings, a professed naturalist will be one of the party, in order that, among many curious problems relating to submarine life, he may determine whether foraminifera can exist at such great profundities, or whether, living

* See 'Russia in Europe,' vol. i., p. 272.

at a higher zone, they have on dying simply subsided, to form the chief part of the fine, undisturbed, muddy bottom.

In the mean time the survey of the *Cyclops* has shown, that a perfectly tranquil and secure resting place is ready for the reception of the greatest length of the cable of the magnetic Atlantic telegraph. May then the accidental misfortune of last summer be avoided, and may the able and vigorous measures of the Company employed in carrying out this grand international work be eventually crowned with all the success they deserve.

Conclusion.—I have now, Gentlemen, to apologize for having detained you so long in my endeavour to lay before you, not merely an analysis of our own labours, but also of those which have been in progress in most parts of the world, together with brief indications of the theoretical as well as practical appliances by which geographical science has been advanced. Let me conclude then with a few words on some of our own immediate operations as sustaining the reputation of the Society, and as influencing public opinion.

The volume of our Journal, the 27th in number, which has recently been issued, has, I trust, been found equal in merit to any one of former years. The mere announcement of some of the names of the contributors and subjects sufficiently testifies that we are well working out our varied objects of research. Thus, whilst the soldier and scholar are gratified with the scrutiny of certain campaigns of the ancient Greeks placed before us by General Jochmus, as derived from a critical examination by him of battle-fields and marches, other comparative geographers may trace with Loftus the course of the Eulæus.

In delineating those parts of Persia with which he has long been familiar, General Monteith has shown us the lines by which bodies of men can advance, and those where great difficulties must be encountered; whilst Rawlinson, comparing ancient with modern geography, has clearly demonstrated the extent to which the delta of the Euphrates has advanced upon the Persian Gulf in the historic period. Again, in the same region Abbott describes the route from Shiraz to Fessa and Darab; and in turning to the hitherto slightly known country of Burma, we have been furnished with a comprehensive, clear sketch of its geographical features by Captain Yule.

From Africa (not to speak of other contributions) we have those original letters of Livingstone which foreshadowed the admirable work which that explorer was destined to produce; whilst from

British America we have put forth Colonel Grant's practical and useful account of the large island of Vancouver, now rising into vast importance through its fine bays and ports, both as a noble station for maritime enterprise in the Pacific, and a future scene of commerce with our newly discovered golden region in the Rocky Mountains.

In short, all our publications, so ably edited by Dr. Norton Shaw, whether they appear in the more matured and staid form of the Journal, illustrated by those excellent maps of Arrow-smith, which give an impress of accuracy to every work of which they form a part, or those popular Proceedings which keep up the "esprit de corps" of our members, and are constant mementos of the animation of our Evening Meetings, have, I am happy to say, given general satisfaction to all readers.

Rejoicing at our last Anniversary at the great rise of this Society in public estimation, it is truly a source of pride and satisfaction to me to see that in the short interval which has elapsed, 166 new members have joined our ranks, and that we now reckon nearly 1100 ordinary associates, or nearly double our numbers in earlier years.

The grant of the use of their apartment for our meetings, by the University of London and the Royal Society, has been of signal advantage; and many of you can testify that the attendances have been so good as almost to crowd that spacious hall.

Let us hope then that this liberal encouragement will be continued; for no one who has participated in our Evening Meetings can doubt that they are productive of enlightening effects upon society in general, by the diffusion of a much greater love of geographical science and foreign travel than was ever before exhibited in this metropolis. I do not hesitate therefore to assert, that the Royal Geographical Society has now taken such firm root in our country, both as regards commercial and public affairs, as to have become part and parcel of the common-weal. Thus, many of Her Majesty's Secretaries of State, whether past or present, belong to us, and afford us the best support by the transmission of documents which we publish at our own expense, and which, though of great importance to geographers as well as to merchants and travellers, would without our aid have remained unknown. Then again, our Map Office and Library in Whitehall Place are the rendezvous for any persons, official or private, who desire to consult the best geographical documents; this great public advantage being gained

simply by the grant of 500*l.* per annum—a sum I venture to say not amounting to a tenth part of what would be incurred, if our highly useful and really national establishment were managed by any Government.

High as we have risen in the last few years, I feel indeed confident from what I see around me, and from a pretty intimate acquaintance with the mainsprings of our prosperity, that our future career may be rendered permanently useful and brilliant, provided only there be a continuance of the same hearty union and good fellowship which now so happily prevail among us. For the part I have borne in this cheering progress, whether in aiding the onward march or in sustaining the dignity of the Royal Geographical Society, I can with gratitude say that my poor efforts have been much overpaid by your kind approbation. Let me then assure you, that as by a sort of friendly fiction, you have evaded the regulations which prescribe that your Presidents should successively retire from office after two years' service, and are pleased to view my first year's labours during the present consulate, as having been given for my lamented predecessor Admiral Beechey, I will try to perform my duties as before, and will not shrink from the endeavour to render my seventh year of probation as effective as any one of my preceding terms of office.

P.S.—An important geographical feature in the outline of the western portion of the Himálaya Mountains has come to my knowledge since this Address was printed. By permission of our Associate and Gold-medallist, Col. Andrew Scott Waugh, Lieut. T. G. Montgomerie has published, in the fourth number for 1857 of the Journal of the Asiatic Society of Bengal, a Memorandum on the Snowy Mountains of the Kashmir series of the Himalayas, in which the Nanga Parbat or Dagarmur, to the north of Kashmir, is estimated at a height of 26,629 feet above the sea.