

to hornblende or augite, the oxide of iron producing the colour. He has also sent me several pieces of mica schist, on which he experimented some years ago by exposing them to a moderate heat and slight pressure. The result of this treatment was the production of an artificial rock almost identical with the vitrified specimens under consideration.

Mr ALEXANDER SOMERVAIL exhibited a very beautiful and well-preserved specimen of *Nautilus marginatus*, Flem., from the "Silver Mine" Quarry, Bathgate. This cephalopod is somewhat rare, and was not met with by the Geological Survey when they visited Bathgate, nor has its occurrence been noted in the Carboniferous Limestones east of the Pentland Hills.

Thursday, 21st January 1869.

ARCHIBALD GEIKIE, Esq., F.R.S., President, in the Chair.

The following Gentlemen were elected Ordinary Fellows of the Society:—

JOHN R. WILLIAMSON, M.E., Edinburgh.
JAMES CROLL, Geological Survey, Edinburgh.
CHARLES MACDONALD, Writer, Thurso.
WILLIAM LIVESAY, University, Edinburgh.

The following Communications were read:—

- I. *Obituary Notice of James David Forbes, D.C.L., LL.D., F.R.S., Principal of the United College of St Salvator and St Leonard in the University of St Andrews, and late Honorary Fellow of the Society.* By ARCHIBALD GEIKIE, F.R.S.

Since the last meeting of the Society we have lost one of the most distinguished of our Honorary Fellows. Principal Forbes died on the 31st of last month. The removal of such a man ought not to be allowed to pass without some tribute to his memory, or some outline, however imperfect, of what he accomplished. It is customary to reserve the notices of deceased Fellows until the beginning of the succeeding session. But on the present occasion we are justified, I believe, in departing from the usual rule. Before proceeding to the ordinary business of the evening, the Society will, I am sure, agree with me in thinking it at once a duty and a privilege to linger for a little over the life and work of our departed associate.

James David Forbes, born at 86 George Street, Edinburgh, on the 20th of April 1809, was the son of Sir William Forbes of Pitligo and Williamina, only child of Sir John Steuart of Fettercairn. His mother, who at the time of his birth was suffering from an advanced state of consumption, was removed, along with her son, in the autumn of the same year, to the south of England,

where she died the year after. The nature of her illness gave Sir William much anxiety for the health of his infant son. The boy was brought back to Scotland, and, as he grew out of infancy, his delicate frame and the quick intelligence which he early began to show seemed to combine to justify his father in the resolution not to urge forward his education. At Colinton, about three miles to the south-west of Edinburgh, and the usual residence of the family, young Forbes acquired the rudiments of knowledge from a governess and the village schoolmaster. He was restricted to such subjects as were indispensable; mathematics, and everything that might appear likely unduly to stimulate his mind, were strictly forbidden. But eventually this extreme paternal solicitude overreached itself. Sir William Forbes had been accustomed in his youth to amuse himself with chemical experiments. Failing health now led him to revive these occupations of his younger years, and he furnished up anew the chemical and philosophical apparatus which had been lying disused for many years. In these pursuits he frequently had as a companion his young son, whose mind gradually acquired in this way the tastes which determined his future career. It was, indeed, impossible to repress the yearning after physical research so early characteristic of Forbes's nature. While dutifully refraining from seeking that instruction in mathematics which had been forbidden to him, he yet laboured quietly at the subject without the aid of a teacher, so as to fit himself for college. Every year continued to form more definitely his bent towards natural philosophy; yet such was his deference to his father's wishes that his studies in that department were carried on at odd moments, and even so late as the year 1827, when already eighteen years of age, his first scientific paper appeared in Brewster's journal, but without his name.

He attended the classes of the Edinburgh University. On leaving college, his favourite pursuits, as he tells us, were geology, meteorology, and general and terrestrial physics.* He made excursions in his own country, and extended his summer rambles into the Continent, particularly to Italy, where he made a careful exploration of the volcanic phenomena of the Bay of Naples,† and to Switzerland, where he formed friendships with some of the foremost scientific men of that country, and where the idea of investigating the natural history of glaciers early began to form itself in his mind.

In the year 1833, when only twenty-four years of age, he was appointed to the chair of Natural Philosophy in his own University—an office which he held with distinction up to 1859.

* Proceedings of the Royal Society of Edinburgh, vol. v. p. 63.

† The results of these researches were given in a series of papers in the *Edin. Journ. Science*.

No one who had the good fortune to hear his prelections will be likely to forget the singular clearness, patience, and thoroughness of his expositions. With his students he was a favourite professor. In his earlier days they found him a young and ardent investigator, who was rapidly rising to eminence in the path of original discovery; in his later years they listened with reverence to the voice of a man who had now achieved a world-wide reputation, and whose ardour in the pursuit of science had even broken down his health.

In addition to his labours in the University, he was indefatigable in attention to the welfare of the Royal Society of Edinburgh, of which he continued to be for many years the active general secretary. He communicated papers which shed a new lustre upon the transactions of that body, eliciting for their author the highest honours which the Society had to bestow, and giving him a name honoured and familiar throughout Europe.

When the duties of the winter were over, he loved to escape to Switzerland, there to renew his researches among the snow-fields and glaciers. He had early in life proposed to himself to examine that country, not as a mere amusement, but as a serious occupation, and with the great De Saussure as his model. Writing in 1843, he says of himself,—“I had the advantage of receiving my first impressions of Switzerland in early youth, and I have carefully refreshed and strengthened them by successive visits to almost every district of the Alps between Provence and Austria. I have crossed the principal chain of Alps twenty-seven times, generally on foot, by twenty-three different passes, and have, of course, intersected the lateral chains in very many directions. I have likewise undertaken similar journeys in other mountainous countries with a view to compare the results; I have spent a part of ten summers on the Continent, and six of these in the Alps and adjacent country.”* From these varied wanderings, but more especially from the careful detailed measurements made during a prolonged sojourn among the Swiss mountains in the summer of 1842, he was enabled to write his great work on the Alps—a treatise which at once established his name as an observant and eloquent traveller, and as the most successful of all the philosophers who had up to that time grappled with the problem of glacier-motion. The publication of his volume, however, by no means completed his labours. Year after year he continued to revisit the Alps, and to send at intervals a narrative of his arduous journeyings to the “Edinburgh Philosophical Journal.” There is reason, indeed, to believe that the excessive fatigue of many of these mountain expeditions began to tell upon his constitution. In 1843, after the publication of his “Travels,” he had an attack of inflammation in the lungs,

* Travels through the Alps, p. 9.

and from that time forward he never possessed the same vigour as before.

In the year 1851 he went to Norway, to make observations partly upon the physical geography of that country, and partly upon the eclipse of the sun on the 28th of July in that year. Owing to the badness of the weather, the latter part of the design was frustrated; but he crossed the Norwegian table-land, and coasted the sea-margin among the fjords and islands from Bergen to Hammerfest. Although only a few weeks in the country, so admirable were his powers of observation, and so carefully had he trained them, that on his return he published a volume which may be taken as the model of a journal of a scientific tour.* "The habit of observation," as he himself remarks in one of his earlier writings, "is of slow growth—to use opportunities we must prepare to seize them."† So well had he accustomed himself to follow this advice, that whether on a carriage, crossing the great fjelds, or rapidly skirting the coast in a steamer, his eye seems ever to have been able to pick out the leading characteristics of the geology or physical geography of the scene, and his pencil to transfer their outlines with wonderful rapidity and truth to his sketch-book. His volume gives by far the most luminous account of the Scandinavian table-land and its glaciers which has yet appeared in our language.

This expedition was to its author a most interesting one, but it told more severely on his frame than any which he had yet undertaken. The zeal with which he laboured to make the most of the limited time at his disposal, added to the privations he had occasionally to endure, allowed him to return in but an enfeebled state of health. In the December of that year he first spat blood to an alarming degree. Recovery proved slow, and in January 1852 he removed to Clifton, where he gradually regained some degree of health and vigour, and was able to prepare for the press the narrative of his Norwegian experience. But there remained in his lungs an amount of disease which was never eradicated, and which made him an invalid for the rest of his life. Every winter after this he suffered much from cough and weakness.

In December 1859, on the removal of Sir David Brewster to Edinburgh, Professor Forbes was chosen Principal of the United College of St Salvator and St Leonard, in the University of St Andrews. His health had now become so impaired that his friends rejoiced in the prospect of his being relieved from the labours of a class-room. Yet it was not without many regrets that he broke up his household in Edinburgh, which had been his home from infancy. I remember visiting him about this

* Norway and its Glaciers, 1853.

† Travels through the Alps, p. 10.

time at his Highland cottage, and being much impressed by the mingled feeling of sadness and relief which seemed to fill his mind on the prospect of removing to St Andrews. "Dear Edinburgh," he remarked, and then remained a while silent, as if to allow his memory to look back over all that the expression suggested.

Alpine excursions were no longer possible, but he enjoyed greatly the rest and recreation which he found in summer at his charming little cottage at Pitlochry. Every summer, for fourteen years, brought him back to that retreat. He loved to be much in the open air. On almost every fine day the Principal was to be seen with his white pony, often far from the wonted pathways, and scrambling to the hill-tops among bracken and heather, to catch the fresh breeze and the distant view. He watched with much interest the construction of the Highland Railway, often visiting the cuttings to examine the ice-worn rocks and overlying drifts. It was on one of these occasions that, struggling through a deep section on a hot day, he brought on one of those alarming attacks of spitting of blood, which were never more than a year or two absent from him since he first began to lose his health. His approach was always welcomed by the labourers on the line—when sick or hurt, they were relieved with supplies from his cottage. He was so perfectly truthful himself that he seldom failed to give ready credence to each tale of hardship that was told to him.

At St Andrews his life wore pleasantly on. The duties of his office were performed by him with the most scrupulous industry. Every year, save the last, he opened the winter session with an introductory address. During his tenure of office, also, he gave three courses of lectures, selecting such subjects as climate and glaciers, which had been his life-long study. He likewise found leisure to continue the researches on heat, on which his celebrity as a physicist mainly rested. The half-monastic quiet of the quaint old town in which he now lived greatly delighted him. When I saw him there for the last time, in the spring of 1867, he showed me an antique folio in manuscript, relating to the history of the University, which he said he was reading with the greatest interest. I understand that he gathered from these records a mass of valuable information, and that among his last labours was to dictate much of what he had thus learned, for the guidance of those who might in future be entrusted with the protection and promotion of the interests of the College.

When the British Association consented to hold its meeting in 1867 at Dundee, Principal Forbes exerted himself greatly to further the success of that meeting. In particular, he suggested and partly organised the Association's excursion to St Andrews, and hoped to be able personally to welcome the visitors in name

of the University. But the hope was destined never to be fulfilled. The disease in his lungs had gained ground in the spring. As the summer wore on the state of his health gave continued anxiety to his family and friends. He had retired for the summer to Pitlochry, but the reinvigorating influence of Highland air had lost its power over him. He was unable to be present either at Dundee or St Andrews. The Association missed his calm thoughtful face, and many were the regrets expressed at the cause of his enforced absence.

Early in the winter of the same year he removed to Cannes, where the climate appeared for a time to arrest the progress of the malady. But in January last the bleeding from his lungs returned, and only ceased in May, when he entered upon his final homeward journey. He reached Clifton much enfeebled, and lingered through the rest of the year, slowly declining from irremediable disease of the right lung. Yet the vigour of his mind remained unimpaired. The few scientific friends who were latterly able to see him were surprised to find him still conversing with his old interest and power upon different subjects which were then engaging the attention of scientific circles in this country. But his course was now nearly run, and at length, on the last day of the year just ended, he quietly passed away.

Of the nature and extent of Principal Forbes's contributions to science at large it is not necessary, nor am I competent, here to speak.* The honours so abundantly bestowed upon him by the scientific societies in this country and abroad, sufficiently show the place which he had in the estimation of those best qualified to judge. The gathering up of the sum of his labours in physics will, doubtless, be undertaken by one well qualified for the task. While in this Society we regret the common loss to science which his death entails, we have special cause to lament his removal from our own field of the scientific domain. It has appeared to me, therefore, to be a duty on this occasion to lay before you an outline, necessarily brief and imperfect, of what our departed friend has done for geology.

Principal Forbes was born in Edinburgh, just twelve years after the death of the great Hutton, only seven years after the publication of the "Illustrations of the Huttonian Theory," and he was already a boy of ten when Playfair died. Many of his friends had been personally acquainted with these philosophers, and the memory of the fierce Plutonian and Neptunian war was still fresh in their minds when he began to give himself to

* Principal Forbes's separate works, and his memoirs, and shorter papers in various scientific publications, are in all more than one hundred and forty in number. See the Royal Society's Catalogue, which, however, only gives his communications to scientific societies and journals, and not all even of these.

scientific pursuits. These early influences are traceable all through his life. He was profoundly impressed with the originality and truth of the views propounded by Hutton, and illustrated by Playfair. In one of his earliest papers he refers to "the splendid Huttonian theory which Playfair undertook so ably to illustrate." * In one of his latest writings he speaks with enthusiasm of the "precious lessons" which one of his friends had drawn from the lips of Playfair and of Hall.† I shall never cease to remember with gratitude that it was he who introduced me, when a boy, to the writings of these masters. He used to speak of Playfair's "Illustrations of the Huttonian Theory," as one of the best books ever written upon the first principles of geological science.

Principal Forbes studied geology under Jameson, from whom he acquired a love for the mineralogical side of the science, and retained it to the last. Moreover, his own predominant tendency towards physics tinged even his geological studies. Hence we find him rising, on the one hand, from a contemplation of the phenomena of glaciers to a philosophical investigation of the laws under which these phenomena occur; on the other, from the mere observation and collection of rocks and minerals, to the natural philosophy of the operations by which they were produced.

His first effort in scientific literature, so far as I have been able to discover, was written in his eighteenth year. It took the shape of a letter to the editor of the "Edinburgh Journal of Science," and was dated from Rome, with the title "Remarks on Mount Vesuvius." It formed, however, merely the prelude to a series of eight papers, entitled "Physical Notices of the Bay of Naples," which were sent at intervals to the same journal. Of these the first two appeared anonymously, with the signature Δ. To the third of the series, published in April 1829, he prefixed his name, and then appeared before the world for the first time as a writer in science.

This series of papers is one of singular merit, considered as the work of so young a man. He describes with considerable detail his personal explorations in the volcanic districts, digesting at the same time the published information on the subject, and presenting a clear narrative of the physical features of that interesting region. Of special excellence is the fifth paper of the series, in which he enters learnedly into the history of the Temple of Jupiter Serapis at Pozzuoli. After enumerating the different hypotheses which had been proposed in explanation of the remarkable geological features of the ruin, he adopts and enforces that which has since been universally acquiesced in,

* Edin. Jour. Science, New Series, i. p. 274.

† Proc. Roy. Soc. Edinburgh, v. 63.

and has become familiar from the writings of Sir Charles Lyell. He shows very clearly that the evidence points to oscillation of the land with respect to the level of the sea, and that other proofs of the same fact are furnished by adjacent parts of the Mediterranean shores. In his concluding paper he offers a *résumé* of the information he had been able to gather relative to the formations of the volcanic Neapolitan district.

No one can read these, the earliest productions of the late Principal, without recognising in them evidence of that scrupulous carefulness and caution which distinguished their writer from first to last. They show, too, the pains which he always took to make himself thoroughly acquainted with the literature of a subject before venturing to write upon it himself. Nor was his reading confined to his own language; it extended to the ancient and modern tongues in which the subjects he happened to be studying were discussed, or through which collateral information might be gathered.

Another of his early contributions to geology is in the form of a short letter to Professor Jameson, on the occurrence of a large greenstone boulder in the Pentland Hills.* It is dated from Colinton House, 3d August 1829, when its writer was a little over twenty years of age. It gives an account of the position of the boulder, its composition, dimensions, and specific gravity. But the chief interest it possesses lies in the broad generalisation which the young observer drew from the facts he had so carefully noted. The boulder lay upon the side of a small, steep ravine, and its position there was such as to lead him to regard the induction as undeniable, "that the excavation of the valley must have taken place subsequently to the deposition of this boulder." He remarks further, that this inference as to the lateness of the erosion of valleys is forced upon us by many other instances, which intimate the gradual degradation of the soil. Those who have watched the progress of geological discussion in recent years will see at how early a period our departed friend had acquired clear views upon this subject, and had based them upon the results of actual observation. This early paper is further interesting, inasmuch as it serves to indicate the special field of geology into which Forbes's natural instincts turned him, and in which he was destined in later years to reap so abundant a harvest. He had often read, and treasured in his memory, the eloquent passages in which Playfair, following in the path of Hutton, had expounded the erosion of valleys, and the universal decay and waste of the continents. He saw that the happy suggestions and sagacious inferences of these philosophers ought to be regarded in the light rather of an outline of what remained to be discovered, than as the epitome of a com-

* Edin. New Phil. Jour. vol. vii. p. 259 (1829).

pleted philosophy. Whatever related to the forces which work upon the surface of the earth and effect geological changes had a special charm for him. It was this tendency which led him to wander, with more than a tourist's curiosity, among the glaciers of Switzerland; which first suggested to him the idea of working out, by accurate observation, the real cause of glacier-motion, still, in his opinion, undiscovered, and which brought him back, year after year, to these great mountains, where he toiled with a devotion that told at last upon his physical frame. He was the first to determine, by careful measurements, the amount and variations of glacier-motion. Comparing that motion to the flow of a river, he propounded the theory that "a glacier is an imperfect fluid or a viscous body, which is urged down slopes of a certain inclination by the mutual pressure of its parts." The observations and journeys which led him to this deduction are detailed in his "Travels in the Alps," a work in which, as in the "*Voyages dans les Alpes*" of De Saussure, which he took as his model, descriptive narrative of scenery and adventure are happily blended with scientific observation and reasoning. The vexed question of the mechanical cause of the motion of glaciers is hardly a geological problem. I would rather refer to the abundant materials collected by Forbes in this work for the elucidation of the geological functions of glaciers. The existing operations of the ice in scoring and polishing rocks, in transporting huge blocks of stone, and in depositing vast mounds of rubbish, are illustrated by him from many an Alpine valley. Recalling the original observations of Playfair, he points out how clear is the evidence for the former wide extension of the glaciers of Switzerland. In short, his eye seems ever to have been upon the watch for every phenomenon bearing upon the mutations of the existing surface of the land.

The lessons which he had thus laboriously learnt among the living ice-rivers of the Alps bore fruit when he came again to wander among the more mountainous regions of his own country. In the year 1840 Agassiz had made the startling announcement that the British Islands had once been deeply buried under a vast mantle of snow and ice, and that the traces of its seaward motion were yet fresh and clear upon the sides of the countless valleys among the uplands. Following up the observations of the Swiss naturalist, Buckland and Lyell had pointed out the former existence of glaciers in the Highlands and other parts of the country. When, however, we look back upon the early discussion of this subject, we are forced to admit that conclusions were often based upon very hasty and imperfect observation. In particular, glacier-moraines were often recognised in places where no geologist would now be able to find them. Much as Forbes knew of the geological effects of ice, his natural caution kept him

from taking part in this discussion for a time, until he was able to produce more accurately determined data than had, in many cases, at least, been available. In the year 1845 he visited the Isle of Skye, and his eye, already trained to recognise the traces of vanished glaciers in Switzerland, was at once struck by the identity of the forms assumed by the rocks at Loch Scavaig with the *roches moutonnées* of the Alps. Further investigation led him to obtain complete demonstration of the former presence of a group of glaciers descending from the rugged scarps of the Cuchullin Hills. He walked over mountain and glen, filling in a rough sketch-map of the glacier valleys as he went along, and in December of the same year he read a narrative of his observations to the Royal Society of Edinburgh. This was the most detailed and satisfactory account which had yet been given of the proofs that the Highlands of Britain once nourished groups of glaciers.*

In the year 1851, as already remarked, Professor Forbes undertook a journey to Norway, partly to make observations of the great solar eclipse, and partly drawn by his love of physical geography, and notably of glaciers. I have referred to the volume in which he has given a narrative of his tour. It was his design to compare the phenomena of glaciers in Northern Europe with those already so familiar in Switzerland. This he has done in a masterly way. His pages contain, in a clear and succinct form, the sum of all that was known at the time regarding the snow-line and the existing glaciers of Norway. I have myself gone over much of the ground he has described, and can bear witness to the accuracy of his sketches, alike of pencil and of pen. His two chapters on the physical geography of Norway have always appeared to me to be a masterpiece of careful yet rapid observation, broad generalisation, and clear description.

But though the tendency of his researches in geology was mainly towards the investigation of the phenomena connected with changes in the outline of the surface, he did not neglect the study of minerals and rocks, in which he had been trained under Jameson. Previous to 1836, with the view of learning more of the history of ancient geological upheavals, he had examined "the trap-rocks of our own island, the ophites of the Pyrenees, and the serpentines of Anglesea and the Lizard; the porphyries of Northern Italy, the granite veins of Mounts Bay and Glen Tilt; the ancient volcanoes of Auvergne, the Eifel, the Siebengebirge, and of Rome; and the modern volcano of Vesuvius."† In December 1835 he gave to the Royal Society of Edinburgh a narrative of his researches in Central France, dwelling more especially on the analogies between the volcanic rocks of that

* Edin. New Phil. Jour. vol. xl. p. 76.

† Ibid. vol. xxi. p. 2.

district and the trappean masses of his own country. Throughout his narratives of foreign travel, also, we everywhere meet with indications that, though busied with what had become his own more special branch of the science, he remained no indifferent observer of the rocks among which his journeys led him. He retained his fondness for mineralogy up to the end. When I last saw him at St Andrews, he showed me a collection of veined agates which he had accumulated in the course of years, and with which he used often to beguile a little leisure in trying to speculate upon the manner in which the concentric siliceous coatings might have been formed.

In concluding this sketch of the late Principal's geological labours, I must not forget that some of his researches, though in themselves dealing with more or less distinctively physical questions, had often important geological bearings. Such were some of his meteorological investigations, and his carefully conducted experiments upon the temperature of the earth at different depths and in different soils near Edinburgh. These experiments were, I believe, the first, at least in this country, made with any degree of precision to determine the rate at which the temperature of the surface is conducted downwards, and the variations due to differences in the nature of the material through which the heat is transmitted.

But it is not from the nature or the number of Principal Forbes's contributions to geology that his interest in our science is to be measured, or that we can learn how much he really did for its promotion in this country. As Secretary to the Royal Society of Edinburgh—an office which he held for many years—as Professor here, and finally as Principal at St Andrews, he had numerous opportunities, which he was ever anxious to use, of encouraging, by a kind word or deed, those who were devoting themselves to geological pursuits. He had watched, with a sadness which he used often to express to his friends, how the halo which shone round Scottish geology in his youth had slowly faded. The last time that he addressed the Royal Society of Edinburgh, this feeling found vent in these expressive words:—"Of all the changes which have befallen Scottish science during the last half century, that which I most deeply deplore, and, at the same time, wonder at, is the progressive decay of our once illustrious Geological School."* I may add that among the last letters which he wrote before leaving this country for Cannes was one to myself, in which he referred anew to the desirability of reviving the active prosecution of geology in Scotland.

Of the man himself I have not spoken, and, indeed, I find it

* Proc. Roy. Soc. Edin. vol. v. p. 18.

difficult to speak. He was my earliest scientific friend, to whom, through a long course of years, I have been indebted for many kindnesses. Yet it is not the partiality of friendship to say that, under a calm and unimpassioned exterior, he wore ever a kindly heart; that the thorough conscientiousness of his scientific work was but part of the moral integrity of his nature; that in all his intercourse, whether with friends or opponents, there was a uniform gentleness and courtesy which nothing seemed ever to ruffle; and that his modesty, either in speaking of his own work or in receiving information on subjects he had deeply studied, was as great as it is rare. He was a true philosopher, and an honourable, kind-hearted man. Into the discussion, so much agitated in recent years, as to the antagonism between revelation and science, he did not enter. While earning an European reputation, he remained a sincere Christian, and the hopes which had strengthened him through life remained to cheer and sustain him at the end.

On the motion of Mr PANTON, Honorary Secretary, a Minute was agreed to by the Society, expressing the deep regret with which they had heard of the death of Principal Forbes; and the Society directed an excerpt thereof to be sent to Mrs Forbes, as a token of their sympathy with her in her present trial.

II. *On the Depth of the Seas in which the Carboniferous Limestone was formed.* By ALEX. SOMERVAIL.

That we can arrive at a knowledge of the precise depth of the seas in which the Carboniferous Limestone was formed is scarcely possible; yet, by a careful study of its extent and thickness, the organic remains with which it is replete, and with what we already know regarding the bathymetrical distribution of life in our present ocean, and the deposits forming over its bed, we may be enabled to form some approximate estimate of the comparative depth of those primeval seas.

The late Professor Edward Forbes held the opinion that the Carboniferous Limestone had been formed in shallow seas, not exceeding fifty fathoms in depth. He was led to this conclusion by certain of the mollusca of that period still retaining patterns of their colour-markings, and by observing that the testaceæ of our present seas that have colours and well-defined patterns seldom inhabit greater depths than fifty fathoms.

It is with some diffidence that I differ from this conclusion of Prof. Ed. Forbes. His inference is not drawn from a number of well-observed facts, but from one solitary case, upon which we can place little or no dependence.