had no place. But if a transcendent knowledge of Nature and her ways, if a firm and ample grasp of her noblest truths, be accounted education, if the devotion through a lifetime of gigantic intellectual powers and of a truly loving heart to the reverent study of God's works be culture, then Hunter, though not a man of letters, was surely a highly educated man. The fame of Hunter, after all, falls far short of him. It may, without exaggeration, be said that he is really greater than to most men, even to most surgeons, he appears to be. It is only after a review of the whole of his vast labours, in their mutual relation, not merely after a study of the merits of his numerous papers, each taken by itself, but in an attempt to apprehend the scheme to which all his labours were subservient, that we are in any measure able to realise the strength of Hunter's genius. Then, as the chief merit of his work is not of a character to catch at once the eye, even of one who searches for it, so his subject is not one of widespread or popular interest. Of all men who have achieved greatness, Hunter requires to be studied with most diligence, the more so because of the absence of all literary skill. And there can be no doubt that he shared the fate of all those who have been, like him, in advance of their time. He was so far beyond his contemporaries as to be, for the most part, out of their reach, and therefore they left him alone; and even his successors have not always found him out. It may, indeed, be said to have been almost by an accident that, in association with the possession of his museum, we have periodically a festival in honour of his memory. Such, then, at least in the eyes of one who, though from afar, has long and earnestly looked up to him, was John Hunter. Beyond all cavil, if the word have any meaning for us, he was a man of genius—a man supremely endowed with power and faculties for the discovery of truth. With little education at the outset of life, without the advantage of the schools, he found himself face to face with the deepest and most mysterious problems of Nature, and he was forthwith able to take full measure of the magnitude of the task. It seems never to have occurred to him that he could snatch an answer by surprise; that a solution could be reached by any short or sudden means. But his survey assured him that upon one plan only, but by that abundantly, could success be made certain. So with patience, which of itself has been called genius, he went back to the beginning. It was genius too, and that of the highest order, to discern, at so vast a distance, where the beginning lay. But there he placed himself, and from that point went forward only when he had made each footstep sure. Who shall say that his imagination was not fertile, or that he faltered in the use of it? Yet no seductive theory tempted him into undue haste, and though sometimes drawn aside by a specious speculation, he seems hardly ever to have been lost in an unsound conclusion. And when he fell, the treasures he had won were found not only in the multitude of facts he had garnered, or even in the principles which, by virtue of the facts he had discovered, were made plain, but also in the very plan and purpose of his work. For, from the height on which at length he stood, not only can the path he trod be clearly traced, but the highway thenceforward is disclosed. So is the greatness of John Hunter to be estimated, not only by what he discovered, but rather by the lesson and example of his work. Truly it may be said of him that he did much. Truly it may be said of him that he showed how much more there is to be done. "He being dead yet speaketh," still speaks to us as no other man before or since has spoken. But when and where can his voice be heard most plainly? Are the spirits of those who have shaken off "this muddy vesture of decay" permitted to revisit the scenes of their earthly labours? Can they still be with us on our way? If the soul of this mighty son of science is ever in our midst, surely his favourite haunt must be now within these walls—in the museum which will soon almost surround us, at once his most graphic and glorious monument. The memory of Hunter, like the memory of the greatest men of every age, is imperishably enshrined. Art, in her noblest efforts, has striven to make his form familiar to us. His name is stamped in indelible characters on the records of human progress. But, before all, he lives in, and draws the breath of life from, his own immortal works. And of these none can be so truly a memorial of the very man as this; no other can so resemble him, can possess so much of him, can tell so fully of what he was; can so perpetuate him in the vast store of facts, in the purpose for which they are set forth, in the illustration of principles, in the suggestion of truths beyond those it can show, above those it can reach—in all this, I say, no memorial, however majestic, can rival our museum. The foundation of this with his own hand and his whole heart he laid; it has grown, and still is growing, from his strength, and it must be made for ever worthy of his name.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—The following new Examiners have been appointed in the Natural Science School: Mr. V. H. Veley (Chemistry), Dr. W. H. Gaskell and Prof. Ray Lankester (Biology), Mr. J. V. Jones (Physics). Mr. W. W. Fisher and the Rev. F. J. Smith are to be Examiners in the Pass Schools.

The Sibthorpian Professorship of Rural Economy is now vacant, and canditates for it are requested to send in their applications to the Registrar of the University before March 10.

The Board of the Faculty of Medicine has issued a list of subjects to be offered in the first examination for the B.M. degree under the new medical statutes.

Scholarships in Natural Science are announced for competition at Merton, Corpus, and Queen's, and at New College.

SCIENTIFIC SERIALS

American Journal of Science, January.—The Muir glacier, by G. Frederick Wright. The paper contains an exhaustive study of this interesting glacier, which lies in the Alpine region of Alaska at the head of Muir Inlet, Glacier Bay, in 58° 50′ N. lat., 136°40′ W. long. It forms a frozen stream some 5000 feet wide by 700 deep, entering the inlet at a mean rate of 40 feet, or 140,000,000 cubic feet, per day, during the month of August. The vertical front at the water's edge is from 250 to 300 feet, and from this front icebergs are continually breaking away, some many hundred feet long, with a volume of 40,000,000 cubic feet. The glacier appears to be rapidly retreating, there being indications that even since the beginning of this century it has receded several miles up the inlet, and fallen 1000 or 1500 feet below its former level.—On the age of the coal found in the region traversed by the Rio Grande del Norte, by C. A. White. The carboniferous beds occurring at various points in this region vary greatly in quality, but none of them appear to be earlier than late Cretaceous age.—The viscosity of steel and its relations to temper (continued), by C. Barus and V. Strouhal. Among the chief results of the authors' further experiments, as here described and tabulated, is the light thrown on the crucial importance of the physical changes which steel undergoes during annealing at high temperatures between 500° and 1000° C. Within these limits occur several nearly coincident phenomena: such as Gore's sudden volume expansion; Tait's sinuously broken thermo-electric resistance; Gore-Baur's sudden disappearance of magnetic quality; the passage of carbon from uncombined to combined; Jean's critical cementation temperature; and the authors' own unique maximum of viscosity.—On the nature and origin of lithophysæ, and the lamination of acid lavas, by Joseph P. Iddings. The data upon which the conclusions here stated are based were obtained from a study of the various forms of structure and crystallisation assumed by acid lavas in cooling, as observed while prosecuting the work of the United States Geological Survey in the Yellowstone National Park under Mr. Arnold Hague. The lithophysæ, composed of prismatic quartz, tridymite, soda-orthoclase, fayalite, and magnetite, appear to be of aqueo-igneous origin, having been produced by the action of the absorbed gases upon the molten glass from which they were liberated during the crystallisation consequent upon cooling. It also seems highly probable that the differences in consistency and in the phases of crystallisation producing the lamination of this rock were directly due to the amount of vapours absorbed in the various layers of the lava and to their mineralising influence.—The latest volcanic eruption in Northern California, and its peculiar lava, by J. S. Diller. The volcanic district here described is that of the so-called "Cinder Cone," near Snag Lake, North California, where the recent character of the eruptive phenomena is most striking as compared with other outbursts in the same region. The lava field, some three square miles in extent, is of basaltic type, but remarkably anomalous in containing numerous grains of quartz, and very high percentages of silica and magnesia with correspondingly low quantities of the oxides of iron. — On the texture of massive rocks, by

George F. Becker. From his researches the author infers that porphyries may form at any depth and no matter how slowly the temperature of the magma may sink, while granular rocks can scarcely ever have been thoroughly fluid or homogeneous, but have often consolidated at pressures extremely moderate compared with those at which it is certain that porphyries would form.—A fifth mass of meteoric iron from Augusta County, Virginia, by George F. Kunz. This specimen, which comes from the same place where was found the largest of the three masses first described by Prof. Mallet, yielded, on analysis: iron 90·293; nickel, 8·848; cobalt, 0·486; phosphorus, 0·243; carbon, 0·177; with traces of copper, tin, sulphur, silica, manganese, chromium, and chlorine. —Note on the origin of comets, by Daniel Kirkwood. It is argued that, although most comets are of interstellar origin, some of short period may have had their rise within the solar system. — The bichromate of soda cell, by Selwyn Lewis Harding. The experiments here described tend to show that this is a most efficient cell, whose effectiveness, as far as its constancy is concerned, might be materially increased by interchanging the positions of the electrodes with their surrounding liquids, after the fashion of the Fuller cell.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 13.—"Supplementary Note on the Values of the Napierian Logarithms of 2, 3, 5, 7, and 10, and of the Modulus of Common Logarithms." By Prof. J. C. Adams, F.R.S.

In vol. xxvii. of the Proceedings of the Royal Society, pp. 88-94, the author has given the values of the logarithms referred to, and the value of the modulus, all carried to 260 places of decimals.

The calculations in that paper were carried to several more decimal places, but the application of an equation of condition which supplied the means of testing the accuracy of the whole work, showed that errors had crept into the work which vitiated the results beyond 263 places of decimals.

Through inadvertence, however, the results were printed in the above paper exactly as they were given by the calculations, although several of the later decimals, especially in the value found for the modulus, were known to be wrong.

The author has now succeeded in tracing and correcting the errors which occurred in the former calculations, and the equation of condition which tests the accuracy of the work is now satisfied to 274 places of decimals.

The present paper gives the parts of the several logarithms concerned which immediately follow the first 260 decimal places as already given in the former paper, and likewise the corrected value of the modulus, which is found to be—

M=·43429 44819 03251 82765 11289 18916 60508 22943 97005 80366
65661 14453 78316 58646 49208 87077 47292 24949 33843 17483
18706 10674 47663 03733 64167 92871 58963 90656 92210 64662
81226 58521 27086 56867 03295 93370 86965 88266 88331 16360
77384 90514 28443 48666 76864 65860 85135 56148 21234 87653
43543 43573 17253 83562 21868 25

which is true to 272 or 273 places of decimals.

February 10.—"Contributions to the Metallurgy of Bismuth." By Edward Matthey.

"An Inquiry into the Cause and Extent of a Special Colour-Relation between certain Exposed Lepidopterous Pupæ and the Surfaces which immediately surround them." By Edward B. Poulton.

Linnean Society, February 3.—W. Carruthers, F.R.S., President, in the chair.—Dr. M. C. Grabham and Capt. G. Wingate were elected Fellows of the Society.—Mr. G. Maw exhibited a *Narcissus cyclamineus* grown by him from bulbs sent by Mr. A. W. Tait, of Oporto. The plant in question was known to Parkinson (1640), afterwards was lost of, and rediscovered by Mr. Johnston, near Oporto, in 1885.—Mr. Maw showed a drawing of *Crocus Karducharum*, and another, for comparison, of *C. zonatus*, from the Taurus, to which it is allied. —Brigade-Surgeon J. E. T. Aitchison read a paper on the fauna and flora of the Afghan boundary. The zoological collection obtained comprised, in round numbers, 20 species of mammals, 130 species of birds, 35 species of reptiles, 7 species of fish, and over 100 species of insects. Among these, many were new to science. Of special interest is the mole-like rat, *Ellobius fuscicapillus*, hitherto only known from the type obtained forty years ago at Quetta. In certain places the ground is riddled with the burrows of this and other rodents. The geographical range of the tiger goes east and north to Bala Murghab; that of the cheetah to the valley of the Heri-rud. A pheasant (*Phasianus principalis*) and woodpecker (*Gecinus gorii*) are new. With some exceptions, the birds are chiefly migratory, their arrival in spring following each other in quick succession. The Brahmini duck (*Casarca rutila*), unlike its congeners, nests and remains throughout the year. The most abundant species of birds are, among the genera *Saxicola*, *Lanius*, *Sylvia*, *Motacilla*, and *Emberiza*. An adult fine example of *Naia oxiana* is a museum acquisition, as the species heretofore has only been recognised from young undeveloped specimens. Regarding the insects, 20 are new, though, taken as a whole, the insect fauna resembles that of Arabia and North Africa, rather than that of India proper. The botanical collections amount to 800 species, and probably 10,000 specimens of plants. Over 100 are new to science. The author gave some account of the physical features of the districts traversed, and of the climate. Taking these into consideration, he states that the plants do not represent what is generally recognised as an Oriental flora, being chiefly composed of northern Persian and Arabian forms, augmented by Central Asian and Siberian types, with a few West Himalayan or Tibetan, and still fewer representing the Punjab or Scind. Beside these are a fairly representative local flora; say, one-sixth of the collection. *Juniperus excelsa* is the only indigenous conifer; neither oaks nor species of *Æsculus*, *Olea*, or *Myrtus* were met with. *Populus Euphratica* forms forests in the river-beds, but as long as the tree is situated near water it is indifferent to altitude. Out of 75 natural orders, Compositæ and Leguminosæ greatly preponderate over the others, containing 81 and 80 species respectively. In Compositæ, *Cousinia* heads the genera with 18 species; *Centaurea* has 10 species. Of 80 species of Leguminosæ, 39 belong to the genus *Astragalus*, 14 of these being new. Of 61 species of Gramineæ, all are well known. The Cruciferæ collected number 56 species; several are new. Chenopodiaceæ follow with 39 species, Labiatæ with 35, Boraginaceæ 32, Umbelliferæ 30, Caryophyllaceæ 30, Rosaceæ 27, Lilliaceæ 26, Euphorbiaceæ 16, Polygonaceæ 15, Ranunculaceæ 14, Rubiaceæ and Cyperaceæ each 13, Scrophularineæ and Plantagineæ 10 and 11 respectively. The orchards at some of the villages are surrounded with high walls, inside which is a row of mulberry-trees grown for the breeding of silkworms. In the Afghan gardens, beetroot, carrots, turnips, cabbages, radishes, and tomatoes are raised, and these are of excellent quality. In the fields, besides wheat, rye, and barley, opium, tobacco, melons, and certain oil-seeds are cultivated. Cotton is grown, but the quality of the fibre is poor. Several plants of pharmaceutical value flourish—Galbanum, Ammoniacum, &c., and of these the author gave a full account.

Zoological Society, February 1.—Dr. St. George Mivart, F.R.S., Vice-President, in the chair. — Mr. F. Day exhibited and made remarks on a hybrid fish supposed to be between the pilchard and the herring, and a specimen of *Salmo purpuratus* reared in this country.—Mr. W. L. Sclater exhibited and made remarks upon some specimens of a species of *Peripatus* which he had obtained in British Guiana during a recent visit to that country, and added some general observations on the distribution and affinities of this singular form of arthropods.—Mr. A. Thomson read a report on the insects bred in the Society's Insect House during the past season, and exhibited the insects referred to.—A communication was read from Dr. B. C. A. Windle, containing an account of the anatomy of *Hydromys chrysogaster*.—Mr. Martin Jacoby read a paper containing an account of the Phytophagous Coleoptera obtained by Mr. G. Lewis in Ceylon during the years 1881, 1882. About 150 new species were described and many new generic forms.—Mr. F. E. Beddard read some notes on a specimen of a rare American monkey, *Brachyurus calvus*, which had died in the Society's Gardens.—Mr. Oldfield Thomas read a note on the mammals obtained by Mr. H. H. Johnston on the Camaroons Mountain. —A paper was read by Capt. Shelley, containing an account of the birds collected by Mr. H. H. Johnston on the Camaroons Mountain. The collection contained thirty-six specimens referable to eighteen species, and of these four were new to science. —Mr. G. A. Boulenger read a list of the reptiles collected by Mr. H. H. Johnston during his recent visit to the Camaroons Mountain.—Mr. Edgar A. Smith read a paper on the Mollusca collected at the Camaroons Mountain by Mr. H. H. Johnston,