

Royal College of Science, South Kensington, are contributed by Prof. G. B. Howes to the October number of the College's *Magazine*, and are accompanied by an excellent portrait of Huxley. This article throws some interesting side-lights upon Huxley's great personality, especially with reference to his bearing towards his students and subordinates.

A passing allusion will suffice for the remaining articles of scientific interest in the magazines that have reached us. *Longman's* contains a popular description of the making of kelp, by Mr. D. J. Robertson, and also a paper on the disappearance of gulls from "Pallinsburn Gull Pond," by Mr. P. Anderson Graham. In *Good Words* Sir Robert Ball writes on "Halley," Sir Herbert Maxwell, Bart., pleads for the preservation of the "Fowls of the Air," and the Marquis of Ormonde describes a short cruise to Norway and Spitzbergen. The *Sunday Magazine* contains the concluding paper by "Eha," on "Voices of the Indian Night." *Chambers's Journal* has, among the subjects of its popular articles: "The Coal of the World," "Migrations of Fish," "Some Modern Uses of Glass," and "A Bundle of Paradoxes." The *Strand Magazine* has a number of graphical representations of statistics referring to the coinage productions of the Royal Mint, by Mr. J. Holt Schooling. The *National* contains a brief appreciative note on Pasteur's work. In addition to the magazines mentioned, we have received the *Quarterly Review*, *Century Magazine*, *Humanitarian* (in which occurs a paper by Prof. W. F. Barrett, on "Dynamic Thought"), and the *English Illustrated Magazine*.

THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM.¹

SUMMARY OF THE CHIEF SCIENTIFIC RESULTS OBTAINED DURING THE YEAR 1894.

I. England and Wales.

THE survey of the Lower Silurian rocks of the Isle of Man has been continued by Mr. G. W. Lamplugh, who finds that the Skiddaw slates of this island, although they possess much lithological variation, are essentially the same mass throughout and are hardly likely to disclose any base to the series. Nor has it been possible to trace any sub-divisions, equivalent to those in the Lower Silurian rocks elsewhere, owing to the absence of fossils.

Reference was made in the previous Report (1893) to certain conglomerates or breccias which it was suggested may have been produced by the breaking up of sandy slates and grits under intense shear strain. These remarkable rocks have been found during the past year to attain an importance altogether unsuspected. Mr. Lamplugh has traced them in definite bands following the prevailing strike of the Skiddaw slates, and generally intercalated between an argillaceous and a more or less arenaceous group of strata. He has found one band to run continuously for eight miles, and thereafter, somewhat less clearly, for four miles further.

In the area of South Wales considerable tracts of Old Red Sandstone have been mapped during the past year by Mr. J. R. Dakyns and Mr. A. Strahan; and so far the following local sub-divisions have been recognised:—

- (3) Grey quartz-grits and conglomerates with some red sandstones. This group forms the uppermost of the whole series.
- (2) Massive red sandstones with some conglomerates and a few red shales, as well as occasional grey sandstones and thin limestones (cornstones).
- (1) Red and variegated marls with bands of soft red sandstone and thin limestones (cornstones).

These three sub-divisions pass into each other.

In Devonshire and Cornwall the re-survey of the Devonian formation and associated igneous rocks has been continued by Mr. Ussher, who has recognised that Upper Devonian strata are largely developed in the southern parts of these counties. Thus they are found skirting the Dartmoor granite, from Kingsbridge Road to Shaugh Prior, not far from Plymouth. In the Plymouth district, they consist of slates with local volcanic materials and a mass of porphyritic diabase at Ford, near Devonport. As they range into Cornwall, they present some specially interesting

¹ Extracted from "Annual Report of the Geological Survey by Sir Archibald Geikie, D.Sc., LL.D., F.R.S., Director General," published in the *Report of the Science and Art Department* for the year 1894.

features. Besides retaining their evidence of contemporaneous volcanic action, they have yielded fossils which prove their stratigraphical position and allow of their being correlated with the Upper Devonian group of other regions.

The progress of mining, since first the maps of the coal-fields were published, has been so great that many of these maps have become more or less obsolete. It is therefore highly desirable, from an industrial and national point of view, that the surveys of our mineral fields should be revised, in order to place within reach of the mining community, and of the public generally, an accurate representation of the various coal-fields on which so much of the material prosperity of the country depends.

The re-survey of the great coal-field of South Wales has now been in progress for three years, and during the past year that of the North Staffordshire and Leicestershire fields has been begun.

During last summer certain improvements were made in the mapping of the Whitehaven district, particularly in regard to the boundaries between the formations and the positions of the faults. One of the most interesting points in this re-examination, made by Mr. A. Strahan, was the proof obtained of the existence of two distinct systems of faults, the one older than the Permian period and running from south-west to north-east, the other later than that period and trending from south-east to north-west. This fact had been previously insisted upon by Mr. J. D. Kendall, to whom the Survey is greatly indebted for his generous courtesy in supplying all the information which he had amassed during a residence of many years in the district as a mining engineer.

The chief work of the past year among the Cretaceous formations has been the tracing, by Mr. Jukes-Browne, of the various sub-divisions of the Chalk over tracts of the southern counties where they had not been previously mapped. Apart from its scientific interest this re-survey of the Chalk is of great economic importance. The maps will henceforth show at a glance the distribution of the various members of the Chalk, and thus will furnish accurate information for the guidance of those who have to sink wells or deal with the water-supply and drainage of the wide chalk-districts of the south of England.

Mr. Whitaker and Mr. Reid have continued the revision of the Tertiary strata in the Hampshire Basin.

During the past year the survey of the Superficial Deposits for the construction of an agronomic map of the country has made good progress in the midland and southern counties, and much new information has been obtained with regard to the extent of the drifts in Monmouthshire and South Wales.

In the valleys that intersect the South Wales coal-field, and chiefly end in the broad dip-slopes of the northern outcrop of Millstone Grit, much boulder-clay as well as gravel has been noticed by Mr. Gibson. It is almost entirely of local origin. That these uplands were overspread with ice is shown by the occurrence of glacial striæ on the Millstone Grit at a height of about 1500 feet above the sea. Further proof that the ice must have existed in considerable mass has been obtained in the excavations of some new waterworks at Nant-y-bwch, where a hill of sandstone upwards of 200 yards in length has been found to be a transported mass. Though its bedding is only slightly disturbed, yet the whole mass has been ascertained to lie upon boulder-clay, and must therefore be regarded as a huge boulder.

In the Isle of Man, Mr. Lamplugh has observed that the marked distinction referred to in the previous Report, between the insular drift of the hills and the extra-insular drift of the low ground still continues. The relative distribution of these drifts seems to prove that both are of truly glacial origin. Most of the deeper glens in the Isle of Man were probably filled with local glaciers before the coming of the great south-flowing ice-sheet which afterwards overrode the island up to its highest summits. As shown by numerous striæ observed on the Skiddaw slates, the general march of the ice during the height of the glaciation seems to have been from some point west of north, instead of east of north, as usually stated. A bed of fine warp or silt in the glacial series of Kirk Michael may prove to be of some economic value. It has been locally used in past time as a fuller's earth, and an effort is now about to be made to introduce it to a wider market for the same purpose.

II. Scotland.

As announced in the previous Report, all the tracts of Lewisian gneiss on the mainland, from Cape Wrath to the Kyles of Skye, have been mapped, but there are many displaced tracts or slices of that formation which lie to the east of the great line of com-

plication, and have undergone more or less deformation in the course of the gigantic earth-movements which placed them in their present positions. So far as at present known, no un-moved tracts of the oldest gneiss are to be looked for in the regions of Ross-shire and Inverness-shire yet to be mapped, but there may be many more or less recognisable disrupted masses among the crystalline schists of that region.

The only area where any of the Lewisian gneiss was mapped last year, on the western or undisturbed side of the great line of displacement, lay in the Island Raasay, where Mr. Teall completed the survey of these oldest rocks. As far as the mapping of the north-west Highlands has advanced, the various crystalline rocks older than the Torridon sandstone, and comprised under the general designation of Lewisian gneiss, may be divided into five distinct groups. (1) What has been termed the "fundamental complex," consisting of various more or less banded and foliated rocks which form together the oldest, and chief part of the gneiss. (2) Highly basic dykes cutting the fundamental complex. (3) Dykes and sills of dolerite, epidiorite, and hornblende-schist. (4) A few dykes of peculiar composition. (5) Gneissose granite, and pegmatite.

Mr. Teall has devoted himself, both in the field and with the microscope in the office, to the patient study of these rocks, and he has at last been able to formulate his views regarding the nature and composition of the various rocks comprised within the first of these sub-divisions, the "fundamental complex." He reports to me that over the greater portion of the area between Skye and Cape Wrath the rocks of the "fundamental complex" have decided affinities, both as regards chemical and mineralogical composition with plutonic igneous products, and his detailed Report, so far as these rocks are concerned, is now fairly complete. They are essentially composed of olivine, hypersthene, augite (including diallage), hornblende, biotite, plagioclase, orthoclase, microcline, and quartz; and the laws of paragenesis are the same as those which govern the composition of peridotites, gabbros, diorites, and granites. It is rare to find any one petrographical type persistent over a large area. Variations in the relative proportions of the different constituents are almost everywhere recognisable, and these variations may be either abrupt or gradual. One general law appears to have been established as far as the fundamental complex is concerned. Whenever the relative ages of two distinct petrographical types can be clearly ascertained, the more basic is older than the more acid.

In classifying the rocks, either with reference to structure or composition, difficulties arise in consequence of transitions in various directions. Many schemes have been proposed; and the following one, based primarily on mineralogical composition, and to a subordinate extent on structure, has been devised by Mr. Teall for descriptive purposes. Theoretical considerations have been excluded, and it is hoped that whatever view may be finally adopted, the broad general facts will be found to have been correctly recorded:—

I. Rocks composed of ferro-magnesian minerals without felspar or quartz.

- (1) Pyroxenites.
Locality. Scourie, Drumbeg.
- (2) Hornblendites.
Same localities as pyroxenites, and also as lumps in the gneiss of many other localities.

II. Rocks in which pyroxenes are the dominating ferro-magnesian constituents. Felspar always present, and in some cases quartz.

- (A) Without quartz.
 - (a) Hypersthene-augite-rocks.
 - (1) With garnet (pyroxene-granulites).
Locality. Scourie.
 - (2) Without garnet (rocks of the Baltimore-Gabbro type).
Locality. Scourie, Gruinard.
 - (b) Augite-rocks. Gabbros in structure and composition, but forming part of the fundamental complex, and often associated with quartz-bearing rocks of a similar character.
Locality. Kyle Sku, Loch Inver.

- (B) With quartz.
 - (1) Augite gneiss.
Locality. Kyle Sku, Loch Inver.

NO. 1358, VOL. 53]

III. Rocks in which hornblende is the dominating ferro-magnesian constituent.

- (A) Without quartz, or containing it only in small quantity. Rocks basic in composition.
 - (a) Rocks massive or only slightly foliated (Amphibolites).
 - (1) Epidote-amphibolite.
Locality. Near Stoer.
 - (2) Zoisite-amphibolite.
Locality. Sangomore Bay.
 - (3) Garnet-amphibolite.
Locality. Between Scourie and Laxford Bridge.
 - (b) Rocks foliated:—
Hornblende schist.
Locality. Between Laxford Bridge and Durness, also at Shieldag, Rona, and many other localities.
Note.—Many of the hornblende-schists found in the Lewisian gneiss are foliated dykes.

(B) With quartz. Rocks intermediate or acid in composition.

- (1) Rocks with compact hornblende and a granular structure. Hornblende-gneiss (proper).
Locality. Between Laxford Bridge and Durness, Poolewe, Rona, Raasay, and many other localities.
- (2) Rocks with hornblende occurring in fibrous or other aggregates:—
Locality. Between Scourie and Loch Inver, especially found in the same area as the augite-gneisses.
- (3) Rocks with compact hornblende, and a more or less granular structure. Granulitic hornblende-gneiss.
Locality. In zones of secondary shear about Loch Inver.

IV. Rocks in which biotite is the dominating ferro-magnesian constituent. Felspar and quartz both present.

- (1) Biotite occurring as independent plates or in aggregates of two or three large individuals. Biotite-gneiss (proper).
Locality. Between Laxford Bridge and Durness, Rona, Raasay, and many other localities.
- (2) Biotite occurring in aggregates of numerous small individuals.
Locality. Associated with the augite-gneisses.
A rare type.
- (3) Biotite occurring as independent plates. Structure granulitic.
Locality. In zones of secondary shear.

While mapping the Lewisian gneiss of Raasay, Mr. Teall observed some curious patches of breccia in that island. One of these descends vertically into the Torridon sandstone, another occupies a similar position in the gneiss. The breccia consists of fragments of Torridon sandstone cemented with calcite, from which small rhombs of clear Iceland spar may be obtained. In one instance where the outlines of the breccia can be more distinctly traced, the ground plan of the mass is nearly semicircular, as if the breccia formed a plug in the Torridon sandstone.

Some interesting additions have recently been made to our knowledge of the Cambrian rocks of the north-west. Mr. Horne has found a band of fossiliferous ironstone, about two feet thick, in the "Fucoid beds" above Auchnashellach Station. The seam is full of a small discinoid or linguloid brachiopod. Mr. Macconochie has renewed his search for fossils in the *Olenellus*-zone, and has obtained additional specimens not only from the localities above Loch Maree and near Dundonnell, but from other outcrops of the same zone further to the north. He has detected fragments of trilobites together with other fossils of the same horizon on both sides of Loch Broom near Ullapool. He has likewise found them where the "Fucoid beds" appear in the River Achull, the Allatryne Burn, Strath Kaniard, Drumrunie and Knockan. Still further north Mr. Peach has obtained fragments of *Olenellus* from the same horizon at Inchnadamph. The ironstone-bed with brachiopods just referred to has been recognised by Mr. Macconochie in Glen Logan and other parts of

the Loch Maree district. It is thus shown that the "Fucoïd beds" contain the fossils of the *Olenellus*-zone from the River Carron in Ross-shire to Loch Assynt in Sutherland.

An important addition to the evidence that tends to connect the quartzites and their associated strata of the south-western Highlands with those of Sutherland and Ross, has been obtained in the island of Islay. Reference was made in the last Report to the occurrence of worm-tracks in the dolomitic shales of that district which so greatly resemble the characteristic "Fucoïd beds" of the north-west Highlands. Twenty specimens of tracks and burrows from the Islay shales have been obtained by Mr. Macconochie, and perhaps it is not too much to hope that eventually some of the other more distinctive fossils of the *Olenellus*-zone may yet be detected there.

In further prosecution of his mapping of the ground between Loch Carron and Loch Alsh, Mr. Peach has obtained additional confirmatory evidence of the view expressed in the last Report that the "Moine-schists" of that region are mainly altered Torridon sandstone and shale. These strata and their floor of Lewisian gneiss, which is occasionally brought up along sharp folds to the surface, are increasingly metamorphosed as they pass to the eastward.

Not less suggestive is the evidence recently obtained by Mr. Horne during his survey of the mountainous ground between the head of Loch Carron and Loch Maree. To the east of the great line of dislocation known as the Glen Logan or Kishorn thrust-plane, as in the ground south of Loch Carron, lenticles of Lewisian gneiss, brought up on the axes of isoclinal folds, occur among the Torridonian rocks, the whole series dipping in an easterly direction. That these long narrow exposures of gneiss are part of the actual floor on which the sedimentary formations rest, is proved by the occurrence of the basal Torridonian epidotic grits resting upon them. By means of this readily recognisable zone of grits and the shaly group that overlies them, it is not difficult to map out each separate isocline and to follow both the succession of the rocks and the structure of the ground.

As we advance eastwards, this metamorphism becomes more marked, the peculiar type or structure of the Moine or eastern schists coming out more and more clearly. It is difficult to understand that any other explanation of the sections can be adopted than that which obviously presents itself on the ground, namely that rocks having every character of true Moine schists, have here been produced by the alteration of a portion of the lowest Torridonian grits and shales with infolded cores of Lewisian gneiss.

Mr. Hinxman, working in that part of Strathspey which embraces the districts of Rothiemurchus, Abernethy and the ground between the Spey and the Dulnan, west from Aviemore, has met with a large tract of biotite-granite, similar to that of the Cairn-Gorm range, to which he proposes to give the name of Monadhliath granite, since it forms the eastern border of the Monadhliath mountains. He has ascertained that in this area, though the granite is fringed with abundant apophyses which penetrate the gneiss to distances varying from a few feet to 300 yards, no fine-grained edges indicative of the chilling of the intruded granite are to be seen. The injections of eruptive material have usually taken place along the planes of foliation, and the bands or planes of granite tend to branch out into mere strings. Besides the apophyses that can actually be traced into the main body of granite, many sills, bands or lenticular veins of similar material, may be seen in the gneiss immediately around the granite, and doubtless emanating from it. All the granitic bands, sills or veins, whether visibly proceeding from the granite mass or not, are thoroughly granitoid in texture and sometimes markedly pegmatitic. Not only do they present no chilled margins, but their crystals may be seen to interlock with those of the surrounding schists. Hence in this area there appears to be no reason to doubt that the present crystalline condition of the schists is coeval with the crystallisation of the material of the granite veins. The evidence, so far as it has at present been collected, appears to point to two conclusions. First, that the granites of Cairn-Gorm, Monadhliath, and other parts of Strathspey, together with most, if not all, of the sills and veins of granite and pegmatite in that region, belong to the same granitic protrusion and are derived from the same magma. Second, that this granitic magma has been protruded into a series of holocrystalline schists and quartzites, and that the contact metamorphism thereby superinduced, gave rise to the highly

granulitic biotite-gneiss with bands of quartzite, which now forms the prevalent rock of the whole region.

In Deeside, Mr. Barrow has ascertained that the great granitic mass south of Banchory presents a very different character. The granite becomes rapidly finer in grain towards its margin, where it assumes the compact texture characteristic of a granite injected among already cooled rocks, while its apophyses are finer in grain than the main body of the rock. Of older date than this eruption is the granitic material, composed of microcline, quartz, and brown mica, which in a vast number of narrow dykes or veins traverses the highly crystalline schists of the south side of the Dee.

The age of the red sandstones which extend along the eastern shore of Arran from Corrie to Brodick and thence across the southern half of the island, underneath the various sheets of eruptive rocks, has been much discussed. By Sedgwick and Murchison these strata were classed as New Red Sandstone, a view that was subsequently adopted also by Ramsay. Afterwards, however, Bryce and other writers placed them in the Carboniferous system, and correlated them with the red sandstones of the north of Ayrshire and Renfrewshire. A re-examination of the ground was made last spring by the Director General in company with Mr. Peach and Mr. Gunn. They found that pebbles of the Carboniferous limestone with its characteristic fossils actually occur in the breccias at the base of these red sandstones between Corrie and the north end of Arran, as was first observed some years ago by Mr. James Thomson. Closer inspection of the coast-sections and of the interior showed that, besides this evidence of a decided stratigraphical break, the red sandstone, conglomerates and breccias lie unconformably on the Carboniferous formations, though at the actual junctions the two series seem almost conformable. That they are probably Permian may be inferred on two grounds. In the first place, the lower group of false-bedded brick-red sandstones presents the closest resemblance to the red sandstones which, within sight on the opposite mainland of Ayrshire, rest upon the Coal-measures, and have been referred to the Permian period. In like manner, they resemble the red sandstones of the south of Ayrshire, Wigtonshire, and Dumfries-shire, which are also assigned to the same period. In the second place, the Arran red sandstones have been found by Mr. Gunn to enclose a contemporaneous volcanic group, a feature which is specially characteristic of the Permian series of the centre of Ayrshire, and of Nithsdale. The occurrence of *Stigmaria* in the volcanic series which lies some hundreds of feet above the base of the red sandstones seems to remove these strata from the New Red Sandstone or Trias, while the strong lithological resemblance which, both as regards their sedimentary and volcanic components, they present to the Permian series of the mainland opposite, renders it highly probable that they are Permian.

Mr. Woodward has mapped separately in Skye, as he did in Raasay, the passage-beds between the Upper Lias and the Inferior Oolite, which include shaly layers, and bands and concretionary masses of calcareous sandstone. These strata in Raasay yielded *Ammonites variabilis*; while in Skye they have afforded a form identified by Messrs. Sharman and Newton as *Ammonites Siemensi*, indicative of the zone of *A. jurensis*. *A. Murchisonae* occurs in the lower part of the Inferior Oolite, and many examples of *A. humphreianus*, and other fossils, not yet determined, have been obtained from the fine cliffs between Beareraig Bay and Invertote. The upper portion of the Inferior Oolite does not appear to be fossiliferous on this Skye coast. It contains some shaly, and lignitic bands, and concretionary masses of sandstone, differing to some extent from the mass of white sandstones so prominent on this platform in the eastern cliffs of Raasay.

The Tertiary dykes of Skye are now being mapped, both on the north-east and south-east coasts. In the latter area Mr. Clough finds them to vary petrographically between the two extremes of pitchstone on the one side and troctolite on the other. Those of acid or intermediate character on the coast north of Loch-na-Daal often indicate the direction of flow of the molten rock in the fissure, by the elongation of the amygdaloids and the orientation of the rows of spherulites. From the variation in the positions of these structural lines, it is clear that the movement of the lava was by no means always vertical, but was often approximately horizontal or oscillating between the two directions. Records of the variations observed are being kept by Mr. Clough.

III. Ireland.

In pursuance of the work described in the last two Reports, Messrs. Kilroe and McHenry have during the past year advanced over a large tract of the difficult ground between Clew Bay and a line drawn from Clifden to Oughterard. Evidence obtained by Mr. Kilroe leads to the conclusion that the Croagh Patrick quartzite and its equivalent further south does not belong to the "Dalradian" series, but is a part of the Llandoverly formation. It will thus be necessary to colour as ordinary Silurian a considerable tract of ground which has hitherto been regarded as composed of metamorphosed rocks. The rocks have undergone a certain amount of metamorphism, but never enough to destroy the clear evidence of their original clastic character.

The investigation by Mr. McHenry of the tract of ground between Clifden and Oughterard has resulted in the collection of a body of evidence which seems to disprove the existence of any Archæan rocks, at least within the area examined. What have been supposed to be rocks of that early age are believed by Mr. McHenry to consist of a complex series of intrusive masses which have pierced the schists, limestones and quartzites of southern Connemara. His survey during last year in that region has convinced him that the whole of these rocks, igneous and sedimentary, are the equivalents in age and petrographical character of the eruptive and metamorphic (Dalradian) rocks of Mayo, Sligo, Leitrim, Donegal, and other parts of Ireland.

Early in March the Director General took the opportunity to make with Mr. Peach and Mr. McHenry an examination of some of the ground around Pomeroy in Tyrone, where there seemed reason to believe that evidence might be found of the occurrence of a marginal strip of Lower Silurian rocks like those which have now been found to flank the southern border of the Scottish Highlands. On a former occasion he had observed among these rocks a remarkable group of basic lavas and tuffs, but could see no evidence to warrant their separation from the chloritic schists to the north of them. Recent mapping along the borders of the Scottish Highlands, however, having shown that a similar group of rocks in that region could be recognised as probably of Lower Silurian age, it seemed desirable that the Tyrone district should be re-examined. The result has been so far highly satisfactory. In company with Mr. Peach, who has also visited the Scottish localities, the Director General spent some days in traversing the Tyrone sections, and had no difficulty in recognising the close similarity of the rocks there exposed to those along the Highland border. The igneous rocks form a strip of country about twenty-four miles long with a maximum of nine miles in breadth, lying between the Silurian and Old Red Sandstone rocks on the south, and the crystalline schists on the north. They include diabase and porphyrite lavas, tuffs, and intrusive sheets. The lavas are interleaved with cherts and jaspers exactly like those associated with the igneous rocks at the edge of the Highlands. Apparently overlying the volcanic masses come dark shales, which might yield graptolites, likewise pale grits and occasional thin limestones. In Scotland the cherts enclose *Radiolaria*, and though these organisms were not detected in any of the Tyrone sections on the occasion of this visit, it may be confidently anticipated that they will be found on further and more detailed search. The radiolarian cherts of the Highland border, with their lavas and tuffs, appear to be a prolongation of those which with the same characters lie in the Arenig formation of southern Scotland, where they extend over a wide area. The importance of the discovery of a zone of Arenig rocks along the edge of the schists in the Highlands and in the north of Ireland will be obvious to all those who have followed the discussion regarding the structure and age of these crystalline schists.

While engaged in the preparation of the "Handbook of the Survey Collections," Mr. Watts had occasion to make many critical examinations of the rocks in the cases of the Museum. Among the new facts which this investigation has established, the following may be noticed:—The wide extent of lamprophyres in the north of Ireland; the occurrence of perlitic cracks in the quartz of the Tardree rhyolite; the remarkable replacement of olivine by tremolite, which eventually develops into idiomorphic crystals in the picrite of Glendalough; the intergrowth of biotite and hornblende in the Crossdoney granite, and the contact metamorphism around that rock.

Among the pebbles in the Drift of the east of Ireland, pieces of a granophyre, with the mineral riebeckite, are not infrequent. Prof. Sollas has been fortunate in finding for the first time one

of these pebbles which contains true crystals of the mineral. He has found them to possess well-developed faces, and has been able to measure and describe them.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. W. B. Prowse, of Pembroke College, has been elected to the Burdett-Coutts Scholarship in Geology, and Mr. R. M. Brydone, of New College, was awarded the scholarship which was not given last year, tenable for one year only. The Burdett-Coutts Scholarship is of the annual value of £115, and is tenable for two years.

CAMBRIDGE.—On November 4 the two vacant fellowships at St. John's College were filled up by the election of Mr. F. F. Blackman and Mr. S. S. Hough, late scholars of the College. Mr. Blackman is Demonstrator of Botany in the University, and took a first class in both parts of the Natural Sciences Tripos. Mr. Hough is Isaac Newton Student in Astronomy, and was Third Wrangler and Smith's prizeman. Both of the newly-elected Fellows have communicated important memoirs to the Royal Society. Mr. Blackman's researches on the respiration of plants were referred to with high commendation by Mr. Thistelton-Dyer in his presidential address to the Botanical Section of the British Association.

The choice of the electors to the Professorship of Botany, vacant by the death of Prof. Babington, fell upon Dr. Marshall Ward, F.R.S., late Fellow of Christ's College, Professor of Botany at the Royal Engineering College, Cooper's Hill. Prof. Marshall Ward graduated B.A. in 1879, taking a first class in the Natural Sciences Tripos.

The State Medicine Syndicate report that, in view of the increasing importance of the study of bacteriology in relation to public health, they have decided to extend the time given to the subject in the Sanitary Science Examination, and to appoint a fifth Examiner specially conversant with it. Thirty-one candidates received the Diploma in Public Health in the last academic year.

The skeleton of a Chillingham bull has been presented to the Museum of Zoology by the Earl of Tankerville.

THE Report of the Royal Commission on Secondary Education has at last been published. The Commission was appointed in March 1894, "to consider what are the best methods of establishing a well-organised system of Secondary Education in England, taking into account existing deficiencies, and having regard to such local sources of revenue from endowment or otherwise as are available or may be made available for this purpose, and to make recommendations accordingly." The Report is divided into four parts, referring respectively to (1) previous legislation on the subject; (2) the state of things now actually existing; (3) the evidence submitted to the Commissioners, with a discussion of the views and suggestions of certain leading witnesses; (4) recommendations calculated to bring about that correlation of existing agencies and economical application of existing funds, which are required for the proper organisation of Secondary Education. Technical Education is included in the term Secondary, and the suggestions in the Report refer to both alike.

DR. FRANZ KÖNIG, Professor of Surgery in Göttingen University, has been elected successor to the late Prof. von Bardeleben in the Chair of Surgery at Berlin. Dr. Joseph Disse, of Halle, has been appointed Professor of Anatomy at Marburg. Mr. Frank H. Constant goes to Minnesota University as Assistant-Professor of Structural Engineering, and Mr. H. Wade Hibbard as Assistant-Professor of Machine Design. Dr. Partheil, of Marburg, has been appointed Professor of Pharmaceutical Chemistry at Bonn.

A FREE library, comprising museum, art galleries, and four branch libraries, has just been opened at Pittsburg. The erection of the institution has taken three years, and the cost—£200,000—has been defrayed by Mr. Andrew Carnegie.

MR. CECIL SMITH has gone to Athens to take up the Directorship of the British School there.