Zealand, 32 in the Antarctic, and 31 in South Georgia, the latter being evidently, from the phytogeographic point of view, a half-way house on the road from subantarctic America to the true antarctic area. Moreover, practically half of the antarctic species are common also to the arctic regions.

Of the 106 antarctic lichens, sixty-nine are crustaceous, eighteen foliaceous, and nineteen fruticulose species; of these, the numbers found in subantarctic America are respectively sixteen, five, and eleven. Of the sixty-seven species found only in the true antarctic area, forty-nine are crustaceous, ten foliaceous, eight fruticulose. The subantarctic American lichen flora includes 366 species, while 740 species have been enumerated for New Zealand; of the species common to the two regions 50 per cent. are fruticulose, 30 per cent. foliaceous, and only 20 per cent. crustaceous. The affinity of the subantarctic American and New Zealand lichen floras lies mainly in the fruticulose lichens, which are the oldest and probably the least variable forms. The encrusting species are more variable and have adapted themselves more readily to local conditions, thus giving rise to new species. An interesting point arises from a comparison with northern lichen floras. The arctic area had nearly 500 lichens, of which 72 per cent. are found in Tyrol. Thus the relation of arctic to alpine lichens is much greater than that of subantarctic American to New Zealand species, indicating that the latter are further from the point of common origin.

Dr. Darbishire raises the interesting question of the resistance of cold by lichens, and suggests some simple experiments which might be made on lichens in the very coldest regions. For instance, it would be of the greatest importance to determine the amount of water contained in the lichen thallus at various times and seasons. In what condition are lichens during the long winter? At what temperature does assimilation commence? It is of little use to try experiments on plants in warmer climates, if we wish to ascertain how these small plants can live under the adverse conditions prevailing in the arctic and antarctic regions.

Lichens are found everywhere on the outer limits of vegetation, and their chief ecological distribution factor is their power to become quite dry and yet remain alive. No doubt it is this property which enables them to spread slowly but surely into the bleakest and most inhospitable regions. They are making their way towards the north and south poles, and so far they have been beaten in their race only by the perpetual covering of snow. There is little doubt that if bare rocks are found in the neighbourhood of the poles themselves, lichens will be found growing there.

Dr. Darbishire's memoir is illustrated by three double plates of beautifully reproduced photographs, depicting the new species brought back by the expedition.

F. C.

APPLICATIONS OF POLARISED LIGHT.[1]

ON November 30, 1812, just above 100 years ago, the French physicist Biot communicated to the Institute of France a memoir "on a new kind of oscillation which the molecules of light experience in traversing certain crystals." In this paper, which extends over 371 pages of the printed memoirs, the phenomenon of "rotatory polarisation" was described for the first time. This phenomenon depends on the property which certain substances possess of taking a beam of polarised light and imparting a twist to the plane of polarisation: the beam of light enters with all the vibrations compressed, say, into a vertical plane; it emerges apparently unchanged, but careful examination shows that the component vibrations are no longer vertical, but inclined either to the right or to the left. The importance of this discovery to physicists and to crystallographers was immediately obvious. In our own generation its fertility has been realised also by chemists, who have found in the polarimeter an instrument which promises to render to the science services not less notable than those which have been accomplished with the help of the spectroscope.

A.—*Sources of Polarised Light.*

If one were to ask what progress had been made in the facilities for applying polarised light to the study of chemical and physical problems, the answer would be twofold. On one hand it must be acknowledged that the "Iceland spar," by means of which Huyghens in 1678 first detected the polarisation of light, is still the best substance for producing this effect. But the increasing demand for the spar has not been accompanied by any corresponding increase in the supply, and large clear pieces of the mineral are becoming increasingly difficult to procure. It may indeed be doubted whether large polarising prisms such as those which have been handed down as heirlooms at the Royal Institution could now be purchased at any price, in view of the "spar-famine" which has prevailed for some years.

Considerable advance has, however, been made in the direction of improved methods of illumination. The solar light, which figured so largely in the experiments of the earlier workers, is too precarious to satisfy the ardent worker of to-day, and in any case could render no direct assistance in illustrating a Friday evening discourse. When Faraday, on Friday, January 23, 1846, delivered his discourse on the magnetisation of light to an audience of 1003 persons, the source of light in the experiments which he described was an Argand gas-burner. Prof. Silvanus Thompson in 1889 was able to use the electric arc, which was then just beginning to come to the front as a commercial illuminant. With this unrivalled source of light he was able to show for the first time in a public lecture a large number of the properties of polarised light which had been reserved hitherto for individual observation in the laboratory. The remarkable effects which are seen when light of one single colour or wave-length is substituted for white light were shown by Spottiswoode in 1878, with the help of a powerful sodium-lamp which had been devised by Sir James Dewar. His lecture was aptly described as "A Nocturne in Black and Yellow."

During several years I have taken a special interest in seeking to discover other sources of monochromatic light for use, in experiments on polarisation, and have been particularly concerned to proclaim the merits of the mercury arc as an illuminant for everyday use in optical investigations.

The Mercury Arc.

The spectrum of the light produced by passing an electric discharge through mercury vapour was described by Wheatstone in 1835 in a report to the British Association on the prismatic decomposition of electric light; but it was not until twenty-five years later that a real mercury-lamp was invented by Prof. Way. This consisted of an intermittent jet of mercury which was directed into a cup half an inch below. The current from a battery of Bunsen cells was passed through the jet and developed an intense light. The spectrum of the light was examined by Dr. J. H. Gladstone, and described in a paper on the electric

[1] Discourse delivered at the Royal Institution on Friday, April 18, by Dr. T. M. Lowry.

light of mercury, published in the *Philosophical Magazine* of 1860 (vol. xx., pp. 249–53).

The first use of the mercury arc as a source of light in polarimetry appears to have been made just ten years ago by two German workers, Disch and Schönrock, working independently (Disch, *Ann. Phys.*, 1903 (IV.), vol. xii., 1155; Schönrock, *Zeit. Vereins Deutsch. Zuck. Ind.*, Tech. Part, 1903, vol liii., 652). Through the personal kindness of Mr. Bastian, I was enabled about three years later to make use of the same source of light in what is still, perhaps, its most convenient form. The glass Bastian lamp was designed to burn with the coils of the arc in a horizontal plane, and was arranged to light automatically in this position. It was with great delight, therefore, that I discovered that, in spite of all warnings to the contrary, the lamp would continue to burn for any length of time with the coils raised into a vertical plane; in this position one of the straight portions of the arc could be focussed by a condenser directly on to the slit of a spectroscope, and so used to illuminate the field of a polarimeter. The lamp consumed very little current, and could be connected directly to the ordinary lighting circuits without any risk of "blowing" the fuses; it was cheap to purchase, and as the resistances formed part of the holder of the lamp there was no need for any auxiliary apparatus whatever. In view of its special suitability for polarimetric work, it is to me personally a matter of some regret that this pioneer lamp has been displaced completely by the more powerful arcs, encased in refractory silica glass, which now adorn the exteriors of so many places of amusement.

When using the mercury arc as a source of violet light, account must be taken of the greatly reduced sensitiveness of the eye to light of such short wavelength. It is here that the silica mercury lamp has proved of such great utility. I am indebted both to Mr. Lacell, of the Silica Syndicate, and to the Brush Electrical Engineering Company for allowing me, for experimental purposes, to distort their well-considered designs for commercial mercury arc lamps. Here, for instance, is a horizontal lamp which has been altered so that the arc can be seen at its greatest intensity in an end-on position. At first the light was liable to be obscured by globules of condensed mercury. But by recessing the window it was kept sufficiently hot to prevent condensation, and this difficulty was effectively overcome. Even then, however, the arc was not so convenient as one arranged in a vertical plane, like the upturned Bastian lamp. It was at this stage that I persuaded the Brush Company to modify for me their "Quartzlite" lamp by twisting one of the terminal **U**-tubes into such a position that it did not empty itself when the lamp was raised into a vertical plane. The "end-on" lamp and the vertical "Quartzlite" lamp have been described in the Transactions of the Faraday Society (1912, vol. vii., pp. 267–70), and were exhibited at the Optical Convention of June, 1912. The lamp shown in Fig. 1 has not been described previously. It combines the merits of both of the preceding patterns, and can be used either horizontally or vertically, and either in a side-on or in an end-on position.

The "Pinch Effect."

One feature of the silica mercury-lamps is sufficiently remarkable to deserve attention. When the arc is first struck by tilting the lamp it fills the whole of the bore of the half-inch tube which encloses it; but, in accordance with Faraday's observation that currents travelling in the same direction attract one another, the parallel threads of current are drawn together until finally, as you see, the arc is "pinched" together into a thread occupying only about one-third of the diameter of the tube. This pinching together of the arc contributes substantially to its efficiency as an illuminant in polarimetric and spectroscopic work; but it is not a suitable form for projection, which demands, as a condition for successful work, a powerful point-source of light.

If the current in the mercury arc is increased, the pinching effect may extend to the point of breaking the threads of current completely and so extinguish the arc.

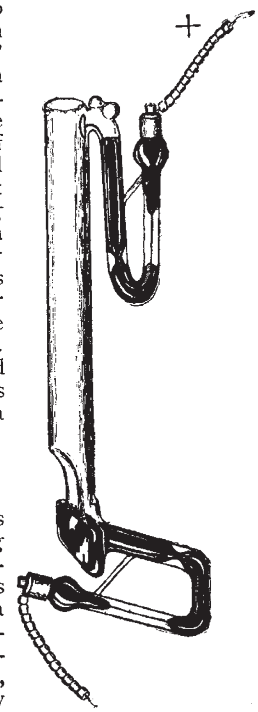


FIG. 1.—Mercury lamp for use in a horizontal or vertical, side-on or end-on position.

It may be of interest to refer here to the well-known fact that the "pinch effect," which I have exhibited on a small scale in a mercury-lamp, is of great importance in the electrical melting of steel on a large commercial scale. In that case a current of great magnitude, flowing through a mass of molten steel enclosed in a circular channel, sometimes causes the metal to pinch together to such an extent that the circuit is actually broken. The "pinching" apart and running together of the mass of molten metal produce a somewhat thrilling display.

The Mercury Spectrum.

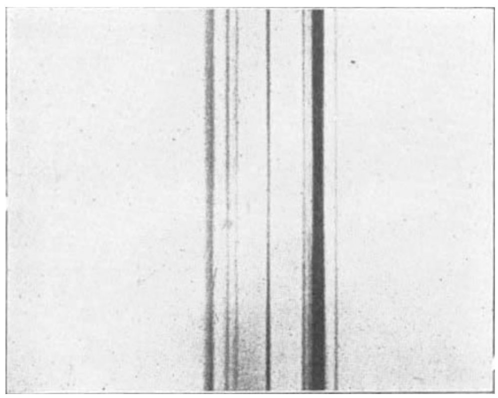
The mercury arc differs from the carbon arc in giving an extremely simple line-spectrum, the chief features of which are a yellow, a green, and a violet component. The yellow component contains two lines, separated by about twenty units of wave-length as compared with six units for the yellow sodium doublet; it shows up well in the spectrum, but on account of its duplex character it is not suitable for use in exact measurements.

By means of powerful high-resolution apparatus, such as the echelon spectroscope, the green line of the mercury spectrum has also been shown to be complex (Fig. 2); but in this case the components are so close together that they do not in any way reduce the value of the line as a source of monochromatic light. The extreme brilliancy of this green line, its high spectroscopic purity, and the ease with which it can be produced, have given to it an unrivalled position amongst the various sources of monochromatic light which are now available for polarimetric work. I can say with confidence that no one who has worked with the mercury-lamp will ever wish to return to the sodium flame, which it is rapidly displacing both in scientific and in technical laboratories.

Dr. Gladstone directed special attention to the strength of the violet lines in the spectrum, of one of which he said that "this ray is situated far beyond what is ordinarily considered the limit of the luminous spectrum." This deep-violet component contains two lines which are clearly visible in the spectroscope; but they lie so near to the limit of visibility that their presence can be shown most clearly with the help of a fluorescent screen. The bright violet line is, from the scientific point of view, one of the most valuable features of the mercury spectrum. The main line is accompanied by two satellites of greater refrangibility; But these are so close to the principal line, and are of so much smaller intensity, that they do not diminish appreciably the unique value of this line, which still remains the most powerful source of monochromatic light for work at the violet end of the spectrum. Actual measurements in which the violet line has been used, both with and without the satellites, have shown that the errors introduced by the presence of the latter do not exceed one part in 10,000 on the readings of a polarimeter. This error would, therefore, be quite inappreciable in the case of all readings of less than 100°.

The visible spectrum does not by any means exhaust the usefulness of the mercury arc. The powerful series of ultra-violet lines, which are freely transmitted by the glass of the silica lamps (Fig. 3), are of value for a number of scientific purposes, and have found an important technical application in the sterilisation of water.

At the other end of the spectrum, the magnificent though invisible line at wave-length 10,140 has proved to be of unique value as a starting point for calibration work in the infra-red. It will also be remembered that some of the longest waves of light that have yet been detected were discovered by Rubens in the radiation from a mercury lamp.



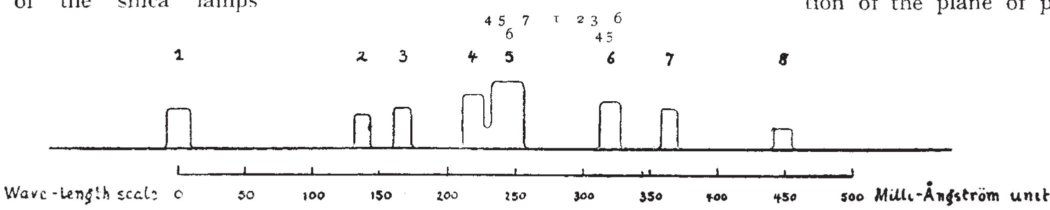


FIG. 2.—Resolution of the mercury-green line by the echelon spectroscope. The actual distribution of the components is shown by the diagram. (*By courtesy of Prof. Stansfield.*)

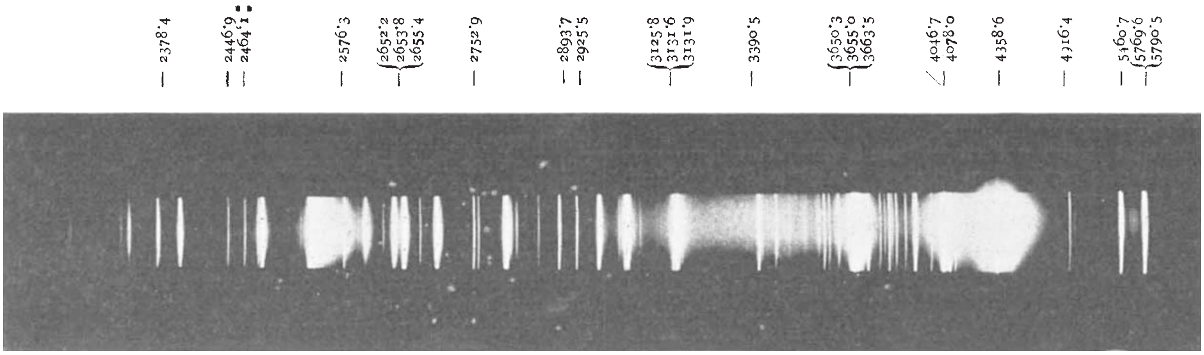


FIG. 3.—The ultra-violet spectrum of mercury. (*By courtesy of Messrs. A. Hilger, Ltd.*)

Resolution of the Mercury Spectrum.

One merit of the mercury arc as a source of light consists in the readiness with which the three main components may be separated. A direct vision prism of quite moderate dispersive power, placed in front of the eyepiece of a polarimeter, produces a separation of the three images which is sufficient for most purposes. The lines may also be separated by means of coloured screens prepared from gelatine films stained with suitable dyes.

B.—*Rotatory Polarisation.*

The phenomenon of rotatory polarisation was first discovered in the case of quartz. Arago in 1811 (Mem. Inst., 1811, pp. 93–134) found that a plate of quartz interposed between a polariser and analyser was capable of depolarising the light in such a way that transmission took place where previously there had been complete extinction. When plates of suitable thickness were used the transmitted light was no longer white, but beautifully tinted, the colour of the light varying with the thickness of the plate. Thus with increasing thickness we have progressively yellow, orange, rose-red, violet, blue, and green.

These colours were shown by Biot to be due to a rotation of the plane of polarisation, which increased (*a*) with thickness of the plate, (*b*) with change of colour from red to violet. It is therefore impossible when a beam of polarised light has passed through a quartz plate to extinguish all the colours simultaneously.

The tints which Arago observed were due to the selective extinction of light of different colours by the mirror which he used as an analyser. This selective extinction may be shown by inserting a direct vision spectroscope in front of the apparatus: the plate which produces the pale yellow colour has rotated the violet light through 180°, so that it is extinguished exactly as if no quartz plate were present; the yellow tint is the complementary colour to that extinguished. As the thickness of the plate increases, the same effect is produced with light of longer wave-length; as the extinction moves from violet to red the complementary colour changes from yellow to orange, red, blue, and green. When the bright yellowish-green is extinguished a grey "neutral tint" is produced which is extremely sensitive to small rotations of the plane of polarisation, and was at one time used very largely in polarimeters illuminated with white light.

When monochromatic light is used—as, for instance, when a green screen is placed in front of the mercury arc—the light can be extinguished completely even after it has passed through a very long column of quartz. Using green light purified by a spectroscope and rods of quartz cut from a crystal of extraordinary beauty, I have obtained a perfectly sharp extinction with a column of quartz half a metre in length, giving an actual rotation of $12,789\cdot20^\circ \pm 0\cdot01^\circ$. I have also been making experiments with the same material to determine accurately what rotation is produced by quartz in light of different wave-lengths, not only in the visible spectrum, but also in the infra-red and ultra-violet regions; but as the work is still incomplete, I will not attempt to describe it, but pass on at once to other ways in which rotatory polarisation may be produced.

Three years after his discovery of rotatory polarisation in quartz Biot was astonished to find that the same property was possessed by certain liquids, turpentine and laurel-oil rotating the plane of polarisation to the left, and oil of lemon and camphor (dissolved in alcohol) rotating it to the right.

In the case of quartz, Biot had attributed the rotation of the plane of polarisation to the crystalline structure of the material. The correctness of this view was proved when it was shown that rotatory polarisation no longer took place when the crystalline structure of quartz was destroyed by melting it or by dissolving it in alkali. In the case of liquids this explanation was no longer possible. Rotatory polarisation must here be attributed to some lack of symmetry in the structure of the molecule rather than of the crystal. It is in such cases that the polarimeter has proved its supreme value in the investigation of molecular structure. In this connection it will be sufficient if I refer to the classical researches of Pasteur, van't Hoff, and le Bel, and to the brilliant contemporary work of Pope, Kipling, Smiles, and Mills in our own country, and of Meisenheimer and Werner on the Continent. In each of these investigations the development of "optical activity" has been accepted as a conclusive proof of molecular asymmetry, and no firmer basis for theories of molecular structure has yet been found than that which rests upon the use of the polarimeter to detect rotatory polarisation.

C.—*Mutarotation.*

In 1846, thirty years after Biot had discovered that rotatory polarisation might occur in liquids as well as in crystals, a remarkable discovery was made by the French chemist Dubrunfaut in reference to the rotatory power of aqueous solutions of grape-sugar or glucose. Dubrunfaut found that by using freshly prepared solutions of the sugar he could observe a transient rotatory power which was twice as great as that observed in solutions which had been prepared a few hours previously. To this remarkable phenomenon he gave the name Birotation.

The same phenomenon, which is now generally known as mutarotation, has since been observed in the case of nearly all the "reducing" sugars. Many explanations were given to account for so mysterious a change, but nothing in the way of proof could, as a rule, be offered in support of these suggestions. In 1890, however, Emil Fischer discovered that similar changes of rotatory power occurred when gluconic lactone was dissolved in water and thus partially hydrolysed to gluconic acid—

$$C_6H_{10}O_6 + H_2O \rightleftharpoons C_6H_{12}O_7.$$

Gluconic lactone — Gluconic acid.

He therefore suggested that a similar explanation might be given of the mutarotation of glucose, thus—

$$C_6H_{12}O_6 + H_2O \rightleftharpoons C_6H_{14}O_7.$$

Glucose. — Glucose hydrate.

Mutarotation of Nitrocamphor.

In 1896 a happy accident led to the discovery that very marked changes of rotatory power occur in freshly prepared solutions of nitrocamphor. But, unlike the case of glucose, these changes could be observed in a large range of solvents. The change varied greatly in the numerical values involved, but was always in the same direction—from left towards right.

The cause of the mutarotation was not difficult to discover. It could not be due to hydration, nor indeed to any direct chemical action of the solvent, but must be attributed to some change of structure in the molecule of the nitrocamphor itself. In view of the fact that the nitro-compound is able to simulate the properties of an acid, giving rise to strongly dextrorotatory salts, there could be little doubt that the change of rotatory power was caused by a partial conversion of the nitrocamphor into its acidic form—a conversion which can be rendered complete by the addition of alkali. This view was immediately confirmed by the discovery of a dextrorotatory anhydride, which could be prepared from nitrocamphor merely by evaporating its solutions on a water-bath.

This interconversion of isomeric compounds, which we have called dynamic isomerism, could also be used to explain the mutarotation of glucose, of which two isomeric forms are known; but there is good reason to believe that the hydrolysis suggested by Fischer is also an important factor when aqueous solutions of the sugar are under consideration.

In the case of π-bromonitrocamphor two isomeric forms of the substance can actually be isolated, thus affording direct evidence that the mutarotation observed in the case of this compound is due to a reversible isomeric change.

Form of the Curves.

In most cases the change of rotatory power proceeds according to a very simple law, the rate of change being directly proportional to the distance still remaining to be traversed.

But I have recently found a number of cases in which the curves are far more complex. In such instances it is necessary to assume a series of successive isomeric changes; but this assumption presents no difficulty, as the substances in question can all be formulated in at least five different ways.

Acceleration by Catalysts.

The mutarotation of glucose is accelerated to a moderate extent by acids and very largely indeed by alkalis. Similar observations have been made in the case of nitrocamphor. Piperidine added to a solution of nitrocamphor in benzene produces a remarkable acceleration which can be detected even at a concentration of N/10,000,000, *i.e.* 1 part in 100 million or 1 centigram per ton. Aniline is 100,000 times less active.

Arrest of Isomeric Change.

The fortunate selection of chloroform as one of a series of solvents led to the discovery of one of the most important facts that have come to light in the course of fifteen years' work on mutarotation. In the very earliest stages of the work it was found that solutions in chloroform behaved in a very irregular and surprising way; the mutarotation in this solvent seemed sometimes to "hang fire" until set going by some accidental stimulus. These observations were evidently important as proving that isomeric change was not spontaneous, even after the nitrocamphor had been dissolved. But for ten years no explanation was forthcoming to show why this phenomenon was observed in chloroform and in chloroform only. About five years ago, however, an arrest of isomeric change was again observed in the case of chloroform solutions to which a trace of acid had been added. These solutions (the rotatory power of one of which "held up" absolutely during twenty-four days) acquired a pungent and horrible odour, and had evidently undergone marked decomposition. It was not long before the odour was recognised as being due to carbonyl chloride—a well-known and (in anæsthetic chloroform) a dangerous impurity, formed by oxidation of the chloroform according to the equation—

$$CHCl_3 + O = COCl_2 + HCl.$$

This substance has the property of attacking ammonia and organic bases, such as piperidine, and converting them into neutral ureas, as shown by the equations:—

$$COCl_2 + 2NH_3 = CO(NH_2)_2 + 2HCl,$$
$$COCl_2 + 2NC_5H_{11} = CO(NC_5H_{10})_2 + 2HCl.$$

The next step was obviously to try to arrest the isomeric change by the addition of carbonyl chloride to a solvent which did not naturally contain it. This was done with marked success. A solution of nitrocamphor in purified ether showed a change of rotatory power extending over about a day; by the addition of carbonyl chloride the period was increased to eighteen days in a glass vessel, and to sixty-one days when a silica vessel (free from alkali) was used to contain the solution. In the case of benzene, to which acetyl chloride was added, the period was increased from sixteen days to sixty-four days in glass, and to two years in a silica vessel. Finally, by the addition of carbonyl chloride to a solution of nitrocamphor in benzene contained in a silica vessel the period was increased from sixteen days to six years.

Action of Light.

A convenient method of studying the effect of light on isomeric change has recently been devised in which the polarimeter plays a leading part. The solution to be studied was enclosed in a silica tube, surrounded by a silica water-jacket, and exposed to the light from a silica mercury-lamp. In seven cases out of nine, however, no acceleration whatever could be detected as a result of this extremely powerful "insolation."

I have attempted to give some account of a few instances in which polarised light has been applied to the solution of chemical and physical problems. In each case the observations have taken the form of measurements of rotatory polarisation. Measurements such as these have supplied to the chemist a key which has enabled him to unlock the strongroom in which many of the secrets of molecular structure were stored. The physicist, too, following in the footsteps of Faraday, has found in rotatory polarisation a link between the sciences of magnetism and optics, and has obtained valuable hints as to the way in which light is propagated through matter. The hundred years which have elapsed since Biot announced his great discovery have therefore served only to enhance its brilliancy, and to reveal it as one of the most illuminating disclosures even of the splendid period in which it was made.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—At Emmanuel College the following awards have been made for post-graduate research:—Studentships: W. N. Benson (petrology), 75*l.*, for half-year only; J. Macdonald (the development of Plato's ethics), 120*l.*; G. Matthai (continuation of research on the comparative anatomy of corals), 150*l.* Grants from the research studentship fund: R. T. Beatty (the energy of Röntgen rays), 25*l.*, for one term only; J. H. Burn (biochemistry), 50*l.*

LEEDS.—Mr. E. L. Hummel has been appointed professor of mining. Mr. Hummel is a son of the late Prof. Hummel, and was educated at Leeds and in Austria. He has had much practical experience in the Yorkshire coalfield and in South Africa with the Vereeiging Estates Company.

MR. WALTER R. CRAWFORD, of Tullyhogue, co. Tyrone, Ireland, has been appointed live stock officer for Yorkshire under the scheme for the improvement of live stock which has been inaugurated by the Board of Agriculture, with the aid of funds set aside by the Development Commissioners. Mr. Crawford has been a chief inspector under the live stock improvement scheme of the Department of Agriculture for Ireland, and is an authority on the breeding of shorthorns and on the work of milk record associations.

LONDON.—An important correspondence between the University authorities and Lord Haldane with reference to the new site for University headquarters has been published. Lord Haldane, in a letter dated June 6, states that he is willing to try again to interest the donors who were prepared in March to acquire the Bedford Estate (British Museum) site for the University. In reply, the Vice-Chancellor raised the questions of the provision of funds for rates and taxes, and for buildings, and of securing an option for additional land in the neighbourhood for extensions. He also inquired whether it would be possible to close the central road between the buildings to traffic. Lord Haldane, in a letter dated July 13, was able to give satisfactory assurances on these points. The sites committee of the University have decided to postpone further consideration until a conference is arranged with the London County Council.

At the meeting of the Senate on July 16, the D.Sc. degree was granted to Mr. J. C. Chapman (King's College) for a thesis on secondary Röntgen radiation; to Dr. G. C. McK. Mathison (University College) for a thesis on the action of asphyxia upon nerve centres; and to Mr. J. Johnstone for a thesis entitled "Tetrarhynchus Erinaceus, van Beneden—I., Structure of the Larva and Adult Worm."

Sir Harry Waechter has offered 300*l.* a year for five years for a department for the treatment of disease by vaccine therapy at University College Hospital.

Grants amounting to 375*l.* for 1913–14 have been made to the following out of the Dixon Fund, for the assistance of various researches:—The Brown Animal Sanatory Institution, Prof. G. Barger, Mr. Morley Dainow, Mr. P. E. Lander, Miss Constance Leetham, Dr. Martin Lowry, Dr. Geoffrey Martin, Mr. J. W. McLeod, and Mr. J. A. Pickard.

PROF. JOHN LAIRD, professor of logic in the Dalhousie University, Halifax, Nova Scotia, has been appointed to the chair of logic and metaphysics in the Queen's University, Belfast, in succession to the late Prof. Park.