

esting and best authenticated is that of Scandium, which has been separated from Norwegian Gadolinite and Ytrotitanite by Nelson and Clive. I had the advantage, when last year in the University of Upsala, of being shown the spectrum of this metal by Professor Thalén, and of making the personal acquaintance of its distinguished discoverers, who showed me the enormous amount of material they worked upon in order to obtain the specimen I saw. Scandium, according to Clive, has the atomic weight 45, and the properties of its compounds are almost exactly those predicted by Mendelejeff of the hypothetical element *Eka-boron*, to which the atomic weight 44 was assigned. We have thus apparently, for the second time, a remarkable verification of Mendelejeff's sagacity and the importance of his so-called Periodic Law. I may here refer to the service Mr. Crookes has rendered by publishing a translation of a revise of Mendelejeff's celebrated paper in *Liebig's Annalen*.

The Report of the Research Fund will be found in the Appendix, and it is not necessary for me to enter upon its details. There is much work always to be done of the highest importance to the advancement of chemistry, but which does not offer sufficient attraction to induce the devotion of the time, perseverance, and money necessary for its accomplishment; here the Research Fund steps in and removes one of the obstacles. In other cases, where the necessary zeal and talent exist to commence a valuable research, the chemist may not be in a position to devote time and money for the undertaking; but with funds at its disposal our Society can prevent the opportunity from being lost. I trust that those whose position of fortune permits of their doing it will contribute largely to the Research Fund, and thus promote the advancement of a science which may have contributed greatly to their own prosperity.

The Drapers' Company for the last three years contributed 105*l.* per annum to the Research Fund, and the Goldsmiths' Company at the commencement gave a munificent donation of 1,000*l.*; the City Companies cannot devote a portion of their vast revenues more usefully than in promoting scientific researches, for with the advance of knowledge will the prosperity of our country develop. The past year has been one of peaceful prosperity in our Society, and we have had a large accession to our members, and the alteration of the bye-law relating to the election of candidates has, on the whole, worked well; but as it has been frequently necessary to postpone the ballot for want of sufficient attendance, it has therefore been thought desirable to make a change in it.

APPENDIX

Third Report of the Research Fund Committee.—During the past session the following sums have been granted from the Research Fund by the Council on the recommendation of the Research Fund Committee:—

30*l.* to Mr. M. Whitley Williams, for the elaboration of an improved method of Organic Analysis.

25*l.* to Mr. M. M. P. Muir, for the study of the Chemical Habitudes and Physical Constants of Bismuth Compounds.

15*l.* to Mr. J. M. Thomson, for experiments on the action of Isomorphous Bodies in exciting the Crystallisation of Super-saturated Solutions.

50*l.* to Dr. Wright, for the continuation of his investigations of certain points in Chemical Dynamics.

25*l.* to Mr. F. D. Brown, for the continuation of his investigation of the theory of Fractional Distillation.

30*l.* to Mr. Bolas, for the preparation and investigation of Alloys and Compounds of Chromium.

20*l.* to Dr. Japp, for the investigation of the action of the Organo-zinc Compounds on Quinones.

100*l.* to Dr. Armstrong, for the determination of certain physical properties, especially the Refractive Indices of Typical Chemical Compounds.

100*l.* to Dr. Wright, for the determination of Chemical Affinity in terms of Electrical Magnitudes.

100*l.* to Mr. F. D. Brown, for the determination of the Vapour Tension of Pure Compounds and of Mixtures.

The two last-mentioned grants were made in February of this year, the others in June, 1879.

A donation of 105*l.* from the Worshipful Company of Drapers, and one of 100*l.* for which the Society is indebted to the generosity of its president, Mr. De la Rue, are important items in the income of the fund for the year. The Committee desire to point out to the Council and to the Fellows at large the desirability of obtaining further additions to the fund, for without

such contributions as these the income arising from investments would have been quite inadequate to meet the legitimate demands upon the fund. It is to be expected, and indeed we hope, that these demands will increase rather than diminish, and it is therefore especially necessary that efforts should be made to increase the income of the fund.

During the session the result of several investigations, in aid of which grants have been made from the Research Fund, have been communicated to the Society.

Dr. Tilden, in a paper on terpene and terpinol (*Trans.*, 1879, 286-290), after describing several properties of these bodies, adduces evidence to prove that the latter is a constituent of some essential oils, as oil of lemon and cajuput.

Prof. Thorp has described (*Trans.*, 1879, 296-309) the results of his examination of so-called abietene, the exudation from the Californian nut or Digger pine (*Pinus sabiniana*). He finds it to consist of the almost pure paraffin, normal heptane, C_7H_{16} , and having thus obtained a considerable quantity of this hydrocarbon, he has availed himself of the opportunity to make a series of most valuable determinations of several of its physical constants.

Dr. Wright, in conjunction with Messrs. Luff and Rennie (*Trans.*, 1879, 475-524), has presented a voluminous third report on his researches on some points of chemical dynamics, describing at length the result of experiments on the relation between the rate of the reduction of cupric oxide by hydrogen or carbon monoxides, time, and temperature.

Mr. F. D. Brown has described the behaviour of mixtures of benzene and carbon bisulphide when distilled under various conditions as a contribution to the theory of fractional distillation (*Trans.*, 1879, 547-562). In a second communication (*Trans.*, 1880, 49-60) he has embodied the results of the comparison of the value of the different methods of fractional distillation.

Drs. Armstrong and Tilden have presented an account (*Trans.*, 1879, 733-760) of their examination of the action of sulphuric acid under various conditions on the terpenes. One of the chief results of their investigation is to establish the fact that no such substance as terebene exists, the liquid hitherto described under this name being simply impure camphene.

Dr. Bedson (*Trans.*, 1880, 90-102) has carefully examined a number of derivatives of phenylacetic acid, an acid which has now become of special interest to the chemist on account of its relation to indigo.

The investigation of Messrs. Hartley and Huntington on the action of organic compounds in absorbing the ultra-violet rays of the spectrum referred to in the last report has since been published in the *Transactions* of the Royal Society. These gentlemen also have since submitted to the Royal Society an account of the results of the combination of the investigations.

Dr. Tilden has communicated the chief results of experiments on the action of hydrochloric acid upon terpenes—a portion of the subject for which he received a grant from the Society—to the Chemical Society of Berlin (*Ber.*, 12, 1131).

The experiments on the action of iodine on terpenes and on the saturated hydrocarbon, referred to by Dr. Armstrong in the last report, have been partially described in communications to the Berlin Chemical Society (*Ber.*, 12, 1756-1790). The publication of the observations on camphor has been delayed in order to render them as complete as possible.

Dr. Japp has forwarded to the Secretaries a paper which will be read at the next meeting, in which he describes the results of his investigations of the action of zinc ethyl on phenanthraquinone.

Several gentlemen who have received grants, but not yet communicated their results to the Society, viz., Messrs. Bolas, Burghardt, Dupre, Jago, Shenstone, and Williams, have favoured the Committee with preliminary reports of the progress made in their investigations.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—A little more than one half of the total cost of the new hall of Newnham College has now been received or paid, and the amalgamation of Newnham Hall with the Lecture Association may be described as almost completed. To pay for the buildings and furnish them about 5,000*l.* more will be needed. The laboratory and gymnasium are excellent.

Messrs. Shaw (Emmanuel College) and Glazebrook (Trinity

College) have been appointed Demonstrators in the Cavendish Laboratory of Experimental Physics.

The University Commissioners have at last put forward a Statute by which students in "Letters" are to have a Doctorate, so that to Divinity, Law, and Medicine, two new faculties are now added, namely, Letters and Science. The University is also to have power to accept as an affiliated college any college in the British dominions, educating principally adult students, and to allow their qualified students three terms of residence towards those required to obtain a Cambridge degree.

The Woodwardian Professor gives notice that as he is prevented by illness from returning to Cambridge at present, Mr. Roberts, D.Sc. [Lond], will lecture for him during the present term.

THE returns already received for the Technological Examinations of the City and Guilds Institute show that over 1,100 candidates will present themselves for examination at eighty centres. This is a very large increase on last year, when only 202 were examined. The examinations are to be held on the evening of May 12, concurrently with the examination of the Science and Art Department on that evening.

SCIENTIFIC SERIALS

THE *Quarterly Journal of Microscopical Science*, April.—W. T. Thiselton Dyer, M.A., Assistant-Director, Kew, on the coffee-leaf disease of Ceylon (six plates).—J. D. Siddall, on *Shepherdella*, an undescribed type of marine rhizopoda (on the plates *Shepherdia*), with two plates. The nucleus in this form seems to be unlike anything as yet described among the rhizopods. The author also figures and describes *Lieberkuehnia wagneri* from Tenby. This rhizopod is only "a native of Berlin" in a very peculiar sense. Claparede's words are, "Nous n'avons rencontré qu'une seule fois ce rhizopode, à Berlin dans une petite bouteille qui renfermait de l'eau de provenance inconnue." The present memoir throws no new light on its probable affinity to *Pamphagus mutabilis*.—A. Sedgwick, on the development of the kidney in its relation to the wolffian body in the chick (with two plates).—F. M. Balfour, notes on the development of the Araneina (with three plates).—Dr. L. Waldstein, a contribution to the biology of bacteria.—Prof. Schafer, some teachings of development.—Prof. T. Jeffery Parker, on the histology of *Hydra fusca*.—Prof. Giard, on the Orthonectida, a new class of the phylum of the worms (with a plate).—Notes and memoranda.

American Journal of Science, March.—On a chart of the magnetic declination in the United States, constructed by J. E. Hilgard.—The old river-beds of California, by J. Le Conte.—Age of the Green Mountains, by J. D. Dana.—On a new action of the magnet on electric currents, by E. H. Hall.—Measures of the polar and equatorial diameter of Mars, made at Princeton, New Jersey, U.S., by C. A. Young.—On the use of the sine-formula for the diurnal variation of temperature, by B. A. Gould.—On the chemical composition of the Uraninite from Branchville, Conn., by W. J. Costock.—On the mean free path of a molecule, by N. D. C. Hodges.—On the western limits of the Taconic system, by S. W. Ford.—Principal characters of American Jurassic dinosaurs, by O. C. Marsh. Part iii.

THE *American Entomologist*, No. 3, new series, March, 1880, contains a multitude of useful notes on questions concerning entomology, amongst which may be noticed trapping the Carpet Beetle (*Anthrenus scrophulariae*).—The Ailanthus silkworm.—Insects injuring the black locust.—The insect enemies of our small fruits, by A. S. Fuller.—The relation between insects and plants, and the consensus in animal and vegetable life, by L. F. Ward.—Birds *v.* insects, by the late E. Perris, translated.—Two days collecting in the Mammoth Cave, with contributions to a study of its fauna, by H. G. Hubbard, the latter especially interesting, giving a list of all the animals hitherto found in this celebrated cave, highly illustrated by excellent woodcuts, with a description of a very curious new form of pseudo-scorpion, described by Dr. Hagen as *Chthonius packardii*. It will be a great advantage if the editors of this periodical give in future a *resume* of the contents of each number. We are requested to notice that it is now published by the Hub Publishing Company of New York, 323 Pearl Street.

Journal of the Franklin Institute, March.—The Edison electric light (continued), by Mr. Outerbridge.—Committee's

report on the Goodwin mowing-machine.—Saws (continued), by Dr. Grumshaw.—Apparatus for illustrating the aberration of light, by Prof. Tobin.—On the acid products of combustion of coal, by M. Vincotte (translation).—Mica, by Mr. Rand.—A new lecture experiment; the cupelling of gold and silver.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 8.—'On the Sensitive State of Vacuum Discharges. Part II.' By William Spottiswoode, D.C.L., LL.D., Pres.R.S., and J. Fletcher Moulton, late Fellow of Christ's College, Cambridge.

This paper forms a sequel to that published under the same title in the *Phil. Trans.*, 1879. It describes a continuation of the research into the nature and laws of the disruptive discharge, or electric spark. The methods of the earlier paper have been extended, and others adapted to the new circumstances have been devised, in order to carry the investigation into high vacua. In particular, independent sources of electricity have been used for effecting the discharge, whether in the sensitive or in the non-sensitive state; and the results have been confirmatory of the conclusions derived from the more limited means formerly described. Further, the effects of various tubes containing discharges in the sensitive state upon a tube containing a discharge in the non-sensitive state have been observed and compared; and the tube so used as a test has been called the standard tube, and the method of its use the standard tube method. By this means, principally, the laws of the discharge in comparatively moderate vacua have been extended to high vacua.

In the higher vacua, the phenomena of molecular streams, and the phosphorescence consequent on them, that have been studied and described by Mr. Crookes, present themselves. These derive great importance for the purposes of the present paper from the fact that in high vacua the ordinary luminous discharge becomes so feeble in appearance that it is often difficult to observe. Under these circumstances the phosphorescence, which, like the ordinary luminous effects, may exist either in a sensitive or in a non-sensitive state, forms the best index of what is going on within the tube. Much information as to the nature and procedure of the discharge may be derived from the mode of interference of one molecular stream with another, from the direction and character of shadows cast by these streams, and by a form of interference which has here been called that of virtual shadows.

The conditions of pressure and of electrical violence, under which phosphorescence is produced, have been carefully studied; and it has been found that, with a suitable adjustment of the discharge, the phenomena are not confined to high vacua, but can be obtained under pressures much exceeding those of ordinary vacuum tubes. The phenomena of these molecular streams have also been compared with those exhibited by the projection of finely divided solid conducting matter when heaped up over the negative terminal, with the view of ascertaining the nature of the phenomenon and its position in the discharge.

At the close of the paper the authors have discussed some of the general conclusions which they think may be fairly drawn from their present researches. First, as to the relative order of magnitude of the time-quantities entering into the discharge; *e.g.*, the times occupied by the discharge of positive or negative electricity, or of molecular streams, in leaving a terminal; the time occupied by the same elements in passing along the tube, &c. Secondly, as to the durational character of the negative as compared with the positive discharge, which appears to increase with the degree of exhaustion. Thirdly, as to the mode of formation of the positive column; and fourthly, as to the relation of the molecular streams to the discharge proper.

But for the details of these conclusions the reader must be referred to the paper itself.

April 15.—'Description of some Remains of the Gigantic Land-lizard (*Megalania prisca*, Owen) from Australia. Part II.' by Prof. Owen, C.B., F.R.S.—Referring to a former Part (*Phil. Trans.* 1858, p. 43), the author gives, in the present, descriptions of subsequently received fossils of *Megalania prisca*, advancing the knowledge of that species of large extinct lizard. Characters of the dorsal, sacral, and caudal vertebrae, with those of a considerable portion of the skull, are detailed. So much of the upper jaw as is preserved shows the species to have had that part sheathed with horn as in the tortoise. Upon the head were