gives 41 paths, nearly all of which were traced on August 21–23, 1879.

IV. On October 15, 1879, the sky was watched for eleven hours (6h. 30m. to 17h. 30m.), and of the 127 shooting-stars seen during that lengthy observation, 21 were slow meteors from a radiant point at 31° + 9°, but the position was not well defined. I had seen several meteors from the same region on the previous night, and on the 20th, when the sky was again favourable, I recorded 10 others, making 37 in all from this shower in the south of Aries. They were generally faint, with rather short paths, and decidedly slow. The same radiant was seen by Major Tupman in 1869, October 13, at 28° + 10°, and Mr. Corder has distinguished a series of October positions in Aries and Pisces. The diagram (IV.) includes 42 paths observed by me in the years 1876–79, but chiefly in 1879.

V. At about the middle of August, 1877, a few rapid meteors were traced from a radiant in Musca at 40° + 28°, and in the following year, while noting the progress of the Perseïds, I recorded several fine meteors, leaving streaks, and with paths averaging 40°. The radiant was evidently on the horizon, and the directions of the meteors, which in several instances were very exactly observed and mapped, indicated the point 44° + 25° as the diverging focus of the shower. With the object of further investigating it, I examined the observations made at the epoch of the Perseids, by the Italians in 1872 and by Zezioli in 1867–70, and found many meteors conforming to this shower of Muscids, which had already been detected by Weiss in 1869, August 11, 46½° + 23½°, and August 12, 41½° + 24°. In this region, between Musca and the east extremity of Aries, there are many successive showers during the four months from August to November. Early in August, when the first display is perceptible, the meteors are very swift, with unusually long paths, and seldom without streaks; but in October and November the motions are generally slow, and the phosphorescent streaks, forming so persistent a feature of the earlier displays, have given way to occasional trains of ashy sparks. The August shower above referred to merits description, as supplying some fine long meteors in the mornings of August. Thirty-eight paths are shown in the diagram, several of which are notable on account of inordinate length.

The several showers here mentioned, being apparently of little less importance than the Orionids, Geminids, Taurids, &c., will no doubt be frequently seen in future years; and it seems desirable to select them from the mass of feeble systems now ascertained, as affording displays of more than ordinary richness.

W. F. DENNING

CHEMICAL SOCIETY—ANNIVERSARY MEETING

WE take the following extract from the address, at the Anniversary Meeting, of the Chemical Society on March 30, by the president, Dr. De la Rue:—

Although since my last term of office I have not been precisely in a sleepy hollow, like that described by Washington Irving, nevertheless my thoughts have been mainly absorbed by other branches of science, and I found myself, on returning to this chair, very much in the same perplexity as Rip Van Winkle when he awoke in the Kaatskill Mountains after his long sleep.

So rapid has been the progress of our science, that much of the aspect of chemical thought has altered in the interval; old and once familiar bodies have not only changed their nomenclature, but new and unfamiliar individuals and families have crowded into the greatly extended domain of chemistry. The very elements which are looked upon as most stable are now considered to be in a critical position, and liable at any moment to dissociation; for it is only a few months ago that the minds of chemists were disturbed by the announcement that spectroscopic evidence afforded by the sun and stars tended to show that the so-called elements were in reality compound bodies. Even if we reserve our judgment on this point, we can no longer assert that the light emitted from the so-called elements, when incandescent or vaporised, is characterised by certain definite wave-lengths. Moreover, we learn that a well-known German chemist, Professor V. Meyer, has actually succeeded in dissociating the halogens, chlorine, bromine, and iodine. The results which he and his coadjutors have obtained appear to leave little doubt that such is actually the case, and we must await the outcome of their continued labours with intense interest.

As regards the spectrum itself, we can no longer attribute certain specific functions and properties to different parts of it; for Captain Abney has shown that every part of the spectrum acts actinically and he even goes so far as to hold out a prospect of Becquerel's beautiful discovery being further extended, so as to produce permanent photographs of the spectrum in its natural colours. In his Bakerian lecture to the Royal Society, Captain Abney has made known his method of preparing a form of silver bromide, sensitive not only to the ultra-violet and the whole visible spectrum, but also to the infra-red rays, and has presented to that Society his magnificent map of the infra-red spectrum. It is difficult to overrate the value of this discovery, and it may be expected that important results will accrue from the investigation of the infra-red absorption spectra of various substances. Indeed, Captain Abney has already informed me of his progress in this direction. The importance of photography, not only as affording a means of investigation, but as a method of permanently recording observations which may be dealt with at leisure, thus affording the means of accurate measurement, in such hands as those of Dewar, Liveing, and Abney, cannot be too highly prized.

A problem which had long baffled all efforts, the artificial production of the diamond, is said to have been solved. Mr. Hannay's communication on the subject is so vague, however, that it is impossible to pronounce any opinion on it. The observations on the solubility of solids in gases, which led Mr. Hannay to attempt to crystallise carbon, and which are described in a recent communication to the Royal Society by Messrs. Hannay and Hogarth, are of great interest, and most important results will doubtless be obtained by an extension of these experiments.

The necessity for further information on the subject of the behaviour of various substances, and especially of mixtures under great pressure, is well shown by the recent remarkable observations of Cailletet, that on compressing a mixture of five volumes of carbon dioxide and one volume of air, the former at first liquefies; but that as the pressure is increased to 150–200 atmospheres, the meniscus of the liquid carbon dioxide becomes plane, and is gradually effaced, until finally the liquid wholly disappears, apparently dissolving in the gas.

Mr. Ansdell's papers on the "Physical Constants of Liquid Acetylene and Liquid Hydrogen Chloride," as determined with the aid of the Cailletet apparatus in the laboratory of the Royal Institution, are valuable contributions to our knowledge of chemical physics, and appear to furnish the interesting result, that the volume of the fluid and gas are equal at the critical point in the case of the latter substance.

Another investigation in chemical physics of great interest is that recently published by Brühl, who has considerably extended the observations of Gladstone, Landolt, and others, on the refractive indices of carbon-compounds. The introduction of a new method of calculating the results by which the influence of dispersion is eliminated, has led him to the discovery of an apparently very simple relation between chemical constitution and refractive power.

The extraordinary diligence of chemists who apply themselves to the investigation of carbon-compounds has also reaped a rich harvest of results. It would be impossible for me to consider the progress of this branch of chemistry in detail, but I cannot help noticing how rapidly the more complex bodies, such as the alkaloïds and the carbo-hydrates, are being forced to yield up the secret of their constitution, which has so long been withheld. The synthesis of *Isatin* by Claisen and Shadwell, and the researches of Baeyer in the indigo-group, must, it would seem, ere long, result in the discovery of a method for the artificial manufacture of this colouring matter.

Ladenburg's success in preparing the alkaloid atropine from *Tropine* and *Tropic* acid, the two substances which it furnishes when decomposed by hydration, is no doubt the first step towards the synthesis of an alkaloid. Great advances have been made in unravelling the constitution of the bases of the Pyridine and Picoline series, and much light has been thrown thereby on the constitution of nicotine and the Cinchona alkaloïds. Moreover, important additions have been made to our knowledge of starch. It is remarkable, also, that a number of new facts have been brought to light tending to prove that the symbolic system at present employed to represent the constitution of carbon-compounds is insufficient.

The year has not passed by without announcements of new members of the family of Elements. One of the most inter-

esting and best authenticated is that of Scandium, which has been separated from Norwegian Gadolinite and Yttrotitanite 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 *Ekaboron*, 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 Crystalisation of Supersaturated 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