you are rather anxious that that action should be stimulated by moderate contributions from the public funds and from rates. As to contributions from rates, I think that as the municipal institutions of our country are more and more reformed and developed, and the more power is given to them in the course of that process of decentralization which is now accepted by almost all politicians, the more power you may give to these localities to act with a certain freed m in the way of assisting such institutions as they think are calculated to advance their interests in every way. There is one point on which I should like to say something from a personal point of view. When I made a remark that your colleges were partly literary and partly technical, I did not wish to convey the impression that I think colleges for general culture deserve less recognition than colleges for technical education I think that they must to a very great extent stand or fall together, and that it would be an error—though I am aware there may be others here wh take a different view—if technical education were too much to displace that general education and development of the intellect which surely must always be one of the great objects of education in every form. I do not know whether the sum which was first mentioned, I think, by Sir John Lubbock has been arrived at by any general agreement, college by college, or whether it is a mere general guess. But I am sure it would be necessary, as a preliminary examination of the case which you have put before me, that there should be some standard suggested, either of numbers or of local contribution, and also of work, before the matter could be taken into serious practical consideration; because not only are there these twelve colleges, but I fancy that, as soon as any arrangement had been made in favour of them, we should find another list of colleges, not precisely on the same footing, but which were sufficiently strong to make a kind of claim on that comparative system which is constantly increasing the national expenditure. I think those of the deputation who are members of Parliament will acknowledge that it would be perfectly impossible to deal with the matter in the supplementary estimate this year, even if we assented to it, without much further examination, for it is really the Education Department which must examine this matter. I have not had the opportunity of consulting my colleagues on the magnitude of the sum which you suggest, or on the general principle. All I can say to-day is that I am glad to receive the suggestions which you have made; that I recognize, of course, the great importance of further developing technical and scientific education; but I cannot pledge myself to any particular sum or to any particular mode of carrying out your wishes. The deputation may rely on the Government giving the matter its most serious attention, and we shall be most willing to receive suggestions from such men as Sir Lyon Playfair, Sir John Lubbock, Mr. Mundella, and the other gentlemen who take so deep an interest in education, to see what practical shape can be given to the wishes of the deputation.

Mr. Mundella observed that the condition of some of the colleges was such that it was desirable that the intentions of the Government should be known at the earliest possible moment.

Sir John Lubbock moved, and the Mayor of Sheffield seconded, "That the thanks of the deputation be given to Mr. Goschen for his courtesy."

The deputation then withdrew.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—"Dispersion Equivalents," Part I. By J. H. Gladstone, Ph.D., F.R.S.

The object of this paper was to bring to the notice, especially of chemists, the subject of dispersion equivalents; a property of bodies similar to the refraction equivalents which are now generally recognized. In the paper of Gladstone and Dale in the Phil. Trans. for 1863 they had adopted the difference between the refractive indices for the solar lines A and H as the measure of dispersion. This, divided by the density, gave the specific dispersion. In 1866 they multiplied this by the atomic weight, and termed the product the dispersion equivalent. The subject has scarcely been touched since that time either by English or Continental observers.

The author holds that the following conclusions are warranted by the accumulated data:—

(1) That dispersion, like refraction, is primarily a question of the atomic constitution of the body: the general rule being that the dispersion equivalent of a compound is the sum of the dispersion equivalents of its constituents.

(2) That the dispersion of a compound, like its refraction, is modified by profound differences of constitution; such as, changes of atomicity.

(3) That the dispersion frequently reveals differences of constitution at present unrecognized by chemists, and not expressed by our formulæ.

The dispersion equivalents of a few elements may be determined by direct observation, such as phosphorus, sulphur, selenium, &c.; but more important results have been obtained from organic substances by comparing the dispersion equivalents of different liquid or dissolved compounds of carbon.

From a consideration of the data afforded by Continental observers, or obtained by the author himself, the following table has been drawn up. The dispersion figures must be taken merely as approximate.

Substance.	Atomic weight.	Refraction equivalent A.	Dispersion equiv. H—A.
Phosphorus	31	18·3	3·0
Sulphur, double bond	32	16·0	2·6
,, single bonds	,,	14·0	1·2
Hydrogen	1	1·3	0·04
Carbon	12	5·0	0·26
,,	,,	6·1 ?	0·51
,,	,,	6·1	0·66
Oxygen, double bond	16	3·4	0·18
,, single bonds	,,	2·8	0·10
Chlorine	35·5	9·9	0·50
Bromine	80	15·3	1·22
Iodine	127	24·5	3·65
Nitrogen	14	4·1	0·10
CH_2	14	7·6	0·34
NO_2	46	11·8	0·82

An examination of many salts of potassium and sodium in aqueous solutions led to the conclusion that there was always a difference of about 0·09 in their dispersion equivalents; but it was not so easy to determine the actual dispersive value of the metals in question, the determinations of potassium from different salts varying from 0·40 to 0·59.

The main conclusion is that the specific dispersive energy of a compound body is a physical property analogous to, but distinct from, its specific refractive energy; and that the phenomena of dispersion are capable in like manner of throwing light upon chemical structure.

Royal Microscopical Society, June 8.—The Rev. Dr. Dallinger, F.R.S., President, in the chair.—Dr. E. M. Crookshank exhibited a series of cultivations of micro-organisms, and called attention to the somewhat unusual circumstance of being able to show such a typical series all growing at the same time. One of the specimens shown was a chromogenic *Spirillum*, which had developed its colour in the depths of the gelatine, contrary to the general rule. He also showed a micro-organism which had been said to cause the swine fever—or, rather, swine erysipelas—in Germany. It was to be noted that in Germany there had been many cases of swine disease, and that a different organism had been found associated with it there from the one found here, and recognized as the cause of Dr. Klein's swine fever. So far as he (Dr. Crookshank) had been able to make out, they were not identical, the German form being an extremely minute Bacillus forming only a cloudy appearance and seeming to be similar to mouse septicæmia. He thought there was good ground for regarding the two diseases as distinct from each other, the German form being swine erysipelas as distinct from swine fever. He also exhibited an example of a Bacillus obtained from putrid fish, which caused the remarkable phosphorescence frequently noticed when fish was decaying.—Mr. Freeman exhibited a number of series of sections of the anatomy of spiders, worms, &c., made by Mr. Underhill at Oxford.—Mr. Eve called attention to some specimens of *Actinomyces* from the jaw of an ox, and described the effect of the disease upon the animal.—Prof. Rupert Jones and Mr. C. D. Sherborne's paper "On the Foraminifera, with especial reference to their variability of form, illustrated by the Cristellarians," was read.—Mr. G. Massee gave a *résumé* of his paper on the genus Lycoperdon, illustrating the subject by drawings on the blackboard.—Prof. Bell said that the Fellows of the Society would remember that in the course of last winter he described what he had observed in some diseased grouse which had been sent to him for examination. Within the last few weeks, the disease, whatever it might be, had been killing grouse in considerable numbers on the moors in the south-west of Scotland. He had received some of these grouse, and examined them very carefully to see if he could discover any cause of death. In the case of the first, though there were tapeworms, there was no evidence that they were the cause of death; in the second case the birds had died from inflammation of the intestines, the cause of which was not quite clear; and in the third case they died of *Strongylus*. It would therefore appear that what was called "grouse disease" must be either more than one disease, or it must be a disease which could kill its victims in different stages. He was himself disposed to think that there was more than one cause of disease, but up to that time there was no diagnostic sign internally to show conclusively what those causes were.—Mr. Grenfell's paper on "New species of *Scyphydia* and *Disophysis*" was read.

Paris.

Academy of Sciences, June 27.—M. Hervé Mangon in the chair.—Remarks accompanying the presentation of a volume on the geodetic and astronomic junction of Algeria with Spain, by General Perrier. In this work, published at the joint expense of the French and Spanish Governments, a detailed account is given of the methods of observation and of the results obtained by the protracted operations which secure for the physical science of the globe the accurate measurement of an arc of the meridian of over 27° comprised between the Shetland Islands and Laghwat in Algeria.—Remarks accompanying the presentation of the first volume of a course of infinitesimal analysis intended for the use of persons who study this science with a view to its mechanical and physical applications, by M. Boussinesq. This work, the first volume of which deals with the differential calculus, is addressed more especially to those physicists, naturalists, engineers, and others, who are little accustomed to the treatment of algebraic formulas, but who, for their special purposes, feel the want of understanding in its essence and chief results the calculus of the infinitely little, or of continuous functions.—Memoir on submarine sound-signals, by M. Brillouin. The two chief results already obtained are transmission of sound to a distance of thirty-five kilometres, and the neutralization of all violent surface disturbances, such as thunderstorms or hurricanes. A summary description is given of the apparatus, together with a general statement of the circumstances under which these signals might be used with advantage.—Observations of Barnard's Comet (May 12, 1887), made at the Bordeaux Observatory with the 0·38 m. equatorial, by MM. G. Rayet, Flamme, and F. Courty.—Observations of a planet sighted at the Observatory of Marseilles, by M. Borrelly. The observations of this body, which is of the twelfth magnitude, extend from June 9 to June 19 inclusive.—On linear differential equations of the third order, by M. Paul Painlevé. In supplement to the paper published in the *Comptes rendus* of May 31, the author here deals with the linear and homogeneous equation of the third order—

$$y''' + ay'' + by' + vy = 0;$$

and he arrives at the general conclusion that, given a linear and homogeneous equation of the third order, it may always be ascertained, by a limited number of purely algebraic operations, whether its integral be algebraic, or the equation may be reduced to a quadrature.—Determination of the quantity of bisulphate of potassa in a diluted liquor, by M. E. Bouty. The author here deals with the difficulty of determining this quantity, which arises from the fact that in diluted solutions the bisulphate of potassa is always accompanied by sulphuric acid and sulphate of potassa. He shows that the bisulphate is stable especially in hot and concentrated liquors, and that the proportion of this salt increases with the excess of one or other of the reacting bodies.—On the ammoniacal vanadates, by M. A. Ditte. The vanadates here treated are those of methylamine, of ethylamine, ammoniaco-magnesian vanadate, and the double ammoniacal vanadates. The general study of these vanadates, prepared by the dry and wet processes, shows that all these compound bodies are reducible to a few well-defined types and simple formulas, such as: $3VO_5,MO$, $2VO_5,MO$, $3VO_5,2MO$, for the acids; VO_5,MO for the neutral vanadates; $VO_5,2MO$, $VO_5,3MO$, $VO_5,4MO$, for the basic salts, apart from the water, the quantity of which varies according to the circumstances in which the crystallization is effected.—Solubility of uric acid in water, by MM. Ch. Blarez and G. Denigès. For the determination of this point the authors have applied the process of analysis by chameleon indicated in their previous note.—On the hydrochlorate of ferric chloride, by M. Paul Sabatier. M. Engel having recently announced that he had succeeded in preparing this substance, which had been anticipated but not isolated by M. Sabatier, the author remarks that so early as 1881 he had obtained and fixed the composition of the hydrochlorate of ferric chloride (*Bulletin de la Société Chimique*, second series, p. 197, 1881).—On the identity of dambose and inosite, by M. Maquenne. A careful study of a remarkably pure specimen of dambonite prepared according to M. Girard's indications from the caoutchouc of the Gaboon, shows that dambose is identical in every respect with the inosite already described by the author. Hence dambonite should be considered as the dimethylene of inosite, and the term dambose should be replaced in chemical nomenclature by that of inosite, which has the right of priority and is in other respects more convenient.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

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