

42 miles, and probable velocity of the object 24 miles per second.

The radiant point in the right hand of Boötes is very little known as a centre of meteoric divergence in the month of January. The only shower conformable with it was observed at Bristol in 1887-9 January 25-29,  $213^{\circ}+52^{\circ}$ .

In recent years fireballs have been very numerous in this month, and especially at the epochs about January 9 to 13 and 24 to 29. They appear, however, to have belonged to a great many different systems, and have not supplied evidence of any rich individual display of bright meteors at this time of the year.

W. F. DENNING.

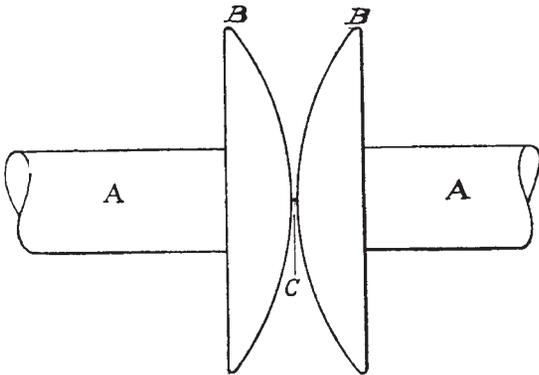
#### METHOD OF PRODUCING WAVES OF FREQUENCY INTERMEDIATE BETWEEN HEAT WAVES AND HERTZIAN WAVES.

THERE is at present a considerable gap of unexplored wave-lengths intermediate between those of Hertzian waves and what is commonly known as heat. The shortest Hertzian waves which have heretofore been produced are of the order of one millimetre length.

Some years ago the writer discovered a method of producing the heretofore unknown waves above referred to.

It is based on the phenomenon discovered by the writer and published by him in a paper on insulation and conduction read before the American Institute of Electrical Engineers in 1894.

In the accompanying figure, AA are copper rods, BB are plano-convex lenses. The distance between the surfaces of



the lenses depends upon the wave-length which it is desired to produce.

If BB were metallic terminals, the discharge passing at c would have a long wave-length on account of the capacity of BB. It is impossible to make metallic terminals small enough to get very short wave-lengths. But, in the apparatus shown in the sketch, if AA are connected to the terminals of a high-voltage machine sparks will be found to pass at c, and the oscillating conductor is merely the small column of incandescent gas, c.

If the distance between BB is very short, the wave-length will also be very short.

Waves may be produced in this method having a wave-length certainly not longer than a few ten-thousandths of an inch, and there would appear to be no necessary limit to the frequency. It sometimes happens that the discharge tends to pass at a point outside the axis, and hence to give a longer wave-length than desired, but this can be avoided by properly proportioning the curvature of the lenses and the diameter of the rods AA.

Inert gases of the helium type seem to give the best results, but very good results are obtained by using quartz lenses in air, the use of quartz having been suggested to me by Prof. Elihu Thomson. Quartz does not seem to become conducting on being heated by the passage of the discharge to anything like the same extent as glass, and hence the wave-length remains more constant.

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Owing to pressure of other work, the writer has been unable to continue these experiments, but the apparatus would seem to be of interest as offering a means of obtaining waves of any desired high frequency.

REGINALD A. FESSENDEN.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The statement of the income and expenditure of the Common University Fund for 1905, published in last week's *Gazette*, shows that the income was 6806*l.* 9*s.* 8*d.*, to which the colleges contributed 6197*l.* 19*s.* 4*d.* under the statute concerning college contributions for university purposes, and the Royal Geographical Society 400*l.* towards the support of the department of geography. The total expenditure was 6260*l.* 14*s.* 11*d.*, of which sum 3662*l.* 19*s.* 5*d.* was devoted to scientific purposes, partly in the payment of the salaries of university readers and professors, and partly in assisting various laboratories and providing demonstrators and assistants.

At a meeting of the Junior Scientific Club, held at the Museum on February 23, Mr. M. H. Godby (Christ Church) read a paper on "The Place of Natural Science in Education."

CAMBRIDGE.—The Vice-Chancellor has been authorised to convey to Lord Rayleigh the grateful thanks of the University for his magnificent gift of 7733*l.* 12*s.* 8*d.*, being the amount of the Nobel prize awarded to him in 1904. Lord Rayleigh desires that 5000*l.* of this should be employed in erecting a new building in connection with the Cavendish Laboratory, and that the remainder should be devoted to the purchase of scientific books and periodicals for the University Library.

Sir George Darwin, K.C.B., Plumian professor of astronomy, will represent the University at the celebration of the 200th anniversary of the birth of Benjamin Franklin at Philadelphia in April.

The Special Board of Biology and Geology recommended that the agreement between the University and Dr. Dohrn, director of the Zoological Station at Naples, be renewed for a further period of five years by the payment to him of 100*l.* per annum out of the Worts travelling bachelors fund.

The General Board of Studies has nominated the following gentlemen as members of the Board of Electors to the professorships named below:—Dr. B. C. A. Windle, to the professorship of human anatomy; Prof. F. W. Oliver, to the professorship of botany; Lord Walsingham, to the professorship of zoology and comparative anatomy; Mr. J. Hutchinson, to the professorship of surgery; the Earl of Carrington, G.C.M.G., to the professorship of agriculture.

The following have been nominated examiners by the General Board of Studies for the special examination in agricultural science and for the diploma in agriculture:—Mr. J. B. Peace, Mr. H. Woods, Mr. T. B. Wood, Mr. R. H. Biffen, Prof. Middleton, Dr. Shore, Mr. T. A. Dickson, and Mr. A. E. Shipley.

At Gonville and Caius College the triennial Thruston prize of 54*l.*, open to a member of the college of not more than fifteen years' standing who has published in the course of the preceding three years the best original investigation in physiology, pathology, or practical medicine, has been awarded to Mr. W. S. Perrin, research student of the college. Mr. Perrin is an expert on protozoology, and has published papers on a so-called trypanosome in the oyster and on *Pleistophora periplanetae*.

LORD RAYLEIGH has promised to lay the foundation-stone of a new science school at Dulwich College on Saturday, March 3.

To the new buildings of the Sorbonne it has been decided to add a new university chemical laboratory, the Institut de Chimie, on a site between la rue Saint-Jacques and la rue d'Ulm, that is, in the neighbourhood of the Sorbonne.

PROF. R. J. HARVEY GIBSON writes from the Hartley Botanical Laboratories, University of Liverpool, to point

out that the proposed grant referred to in a note last week (p. 406) is to be made to the botanical laboratories to meet the expenses of investigations in applied botany which the agricultural committee of the County Council desires the botanical department of the University to carry out. He adds:—"There is no department of economic botany in the University, nor has any fund been collected for the establishment of such a department, so that the cost of such a school is not in any sense 'guaranteed.'"

THE Treasury has appointed a permanent committee to advise the department as to the distribution of the grant-in-aid of colleges furnishing education of a university standard. The constitution of the committee is as follows:—The Rev. H. G. Woods, chairman, Sir Francis Mowatt, G.C.B., Sir William J. Collins, M.P., Prof. Henry Jackson, and Prof. W. S. McCormick. Mr. R. G. Hawtrey, of the Treasury, will act as secretary. Dr. H. G. Woods, the chairman of the committee, was in 1901 a Treasury Commissioner for the inspection of university colleges. It will be noticed that the interests of science are not represented upon the committee.

THE academic congress, which recently met in St. Petersburg to consider a number of questions relating to Russian higher education, arrived at the following conclusions:—The Imperial Russian universities ought to be State institutions, the duty of which should be to foster the natural sciences; they should be autonomous institutions, responsible only to the Minister of Education; they should, further, be open to persons of both sexes alike, irrespective of nationality and religious creeds; the university diplomas should give no privileges in the entrance to the professions, &c.; the State examinations should be maintained, and those persons desirous of exercising the right of putting their knowledge to professional uses should be required to submit themselves to the corresponding State examinations; the degree of "Master" should be abolished, and those now holding it should receive the "Doctor's" degree.

THE Charity Commission has forwarded to the Education Committee of the London County Council a draft scheme which provides that the City Polytechnic, which hitherto has comprised the Birkbeck College, City of London College, and Northampton Institute, shall cease to exist. It is proposed that the Birkbeck College and the City of London College shall constitute separate foundations, while the Northampton Institute shall constitute a separate charity. The whole of the endowments of the Birkbeck College and the City of London College are determined as educational endowments, and will therefore henceforth be under the control of the Board of Education and not of the Charity Commissioners, but the Northampton Institute, as a charity, will presumably continue to be supervised by the Charity Commission, and power is reserved for the establishment of further schemes in respect of the two colleges by the Board of Education and in respect of the Northampton Institute by the Charity Commission. Subject to these provisions, the several institutions are to be managed in accordance with their existing schemes and by their present governing bodies.

IN the House of Commons on Monday Mr. Austen Chamberlain asked the Chancellor of the Exchequer whether he had undertaken to include in the Estimates for 1906-7 a sum of 20,000*l.* for the building fund of the University College of North Wales, to which fund 61,000*l.* had been subscribed locally; if so, whether any conditions had been attached to the proposed grant; and whether he would make provision in the Estimates for similar grants to the universities and university colleges of England in the same proportion to the local subscriptions. In reply, the Chancellor of the Exchequer said:—"I have undertaken to ask Parliament to make a grant of 20,000*l.* to the building fund of the college when the money is actually required for the scheme, and subject to the condition that a similar sum has first been spent upon it from other sources. No part of this grant will have to be provided in the Estimates for 1906-7. Similar grants have already been made to the two other Welsh colleges of like character. No such grants have in the past been made to university

colleges in England, and, as the annual grants to these institutions were largely increased—as I think most properly increased—by the right hon. gentleman when he was Chancellor of the Exchequer, I am not, as at present advised, prepared to recommend a change of policy."

THE annual meeting of University College was held on February 21. Lord Reay, who presided, referred to the incorporation of the college in the University of London, and said its object is to secure the good of university education in London as a whole. Speaking of the proposed college of technology, Lord Reay said he is convinced that increased facilities for higher technological work are required in London, but unless all such higher technological work is in the hands of the same authority there will be the same risk of overlapping, duplication, possibly of triplication, that there has been in the past. Now is the great opportunity for giving to the University its due responsibility, and from what the University has done in the last five years, said Lord Reay, it will not fail to bear that responsibility. If brought within the University the new college of technology would be managed by a college committee such as University College will be managed. Such college committee would be subject to the general direction on matters of university policy of the Senate, but in all other matters it would be practically self-governing. It would be possible to start the new college at once within the University, and while starting it with a committee under the Senate there would be time to consider what modifications in the general constitution of the University would be made necessary.

IN the absence of Mr. Chamberlain, the Chancellor, Alderman C. G. Beale, the Vice-Chancellor, presided at the sixth annual meeting of the Birmingham University Court of Governors on February 21. From the financial statement it was seen that the income for the year had been nearly 43,000*l.*; two new chairs had been inaugurated during the last twelve months, one for electrical engineering and the other for civil engineering. The engineering department as a whole had moved into its new quarters at Bournbrook; although they were expecting the early completion of this section, they were also looking forward to the beginning of another by reason of the generous donation of 50,000*l.* in November of last year; the exact form of the extension was not yet fully decided, but plans for the erection of new chemical and physical departments were being prepared. Remarking upon the difficulty of determining how far a certain sum of money would go in providing such accommodation, Alderman Beale observed that whatever was done should be done on a sufficiently large scale to be permanent; they had sufficient experience to show that the large scale would be the best in the long run. The erection of the Harding Memorial Library, the outcome of the generous gift of 10,000*l.* from the family of the late Mr. Charles Harding, was contemplated. The University had broken new ground, as stated in the principal's report, by the appointment of Mr. W. E. Collinge as special lecturer in economic biology.

LORD HALSBURY delivered an address at the annual prize distribution of the City and Guilds of London Institute on February 16. He said that the old apprenticeship system was a good rough-and-ready way of teaching young people what they wished to practise later in life. What has been attempted more recently, however, is to teach, not only how to do things, but the principles underlying their action. As the result of the developments of modern life, the whole world has become the market for competition. In Germany, France, Switzerland, and other Continental nations it has long been recognised that the old ways in trade and commerce will not do, and the people there have been preparing themselves by technical education, and in other respects, not only to hold their own, but to forge ahead in the industrial race. It is all very well for us to assume an indifferent air, and say that we have been getting on very well. Unfortunately, the facts seem to tell a different story. For the maintenance of our commerce we must use the means that other countries have used with such successful results. As a judge, Lord Halsbury was often struck with the large number of patent cases that

came before him in which the patents had been taken out in Germany and brought over here to be developed and worked at a profit. Why was this? While Germany has founded numerous places for chemical experiment and research, nothing of the kind is provided here, except at such colleges and schools as those belonging to the City and Guilds of London Institute. It is a matter of national concern that whatever is possible should be done to give a stimulus to the scientific and industrial activity of the country.

### SOCIETIES AND ACADEMIES.

LONDON.

**Society of Chemical Industry** (London Section), February 5.—Mr. R. J. Friswell in the chair.—Carburetted water gas in the Bunsen burner: M. **Chikashigé**. Carburetted water gas is now prepared in the Kyoto University by injecting heavy petroleum oil with steam into a water-gas generator filled with ignited coke. The gas produced is passed through a superheater loosely packed with fire-bricks, and then through a scrubber, after which treatment it enters the gas holders. The mean composition of the gas differs little from that of coal gas, and the products of combustion closely resemble those of coal gas. The carburetted gas has no effect on the ordinary laboratory vessels, and the products of combustion, unlike those of plain water gas, are not more injurious in insufficiently ventilated laboratories than those of coal gas.—The loss of nitre in the chamber process, part ii.: J. K. H. **Inglis**. The loss of nitre, which usually amounts to about 3 per cent. of the sulphur burnt, can best be traced by complete analyses of the flue gases. The analysis cannot be carried out by means of aqueous absorbents owing to the formation of complicated bodies by the interaction of nitrous acid and sulphur dioxide. But the analysis may be conveniently made by the fractional distillation of the gases, first at the temperature of liquid air and subsequently at higher temperatures. The results showed that only about 4 per cent. of the lost nitre was lost as nitrous oxide and 43 per cent. as nitrogen peroxide. In the first experiments the temperature of liquid air was insufficient to effect the separation of nitric oxide from the flue gases owing to the vapour pressure of nitric oxide. Some further experiments were therefore made at a lower temperature obtained by making liquid air boil under diminished pressure. The amount of nitrogen oxides found was no greater than in the earlier experiments, and this might therefore mean that nitric oxide is not present in the flue gases.—The removal of nitrous acid from concentrated nitric and sulphuric acid: O. **Silberrad** and B. J. **Smart**. The experiments were made to determine to what extent the reaction between nitrous acid and amines or amides occurs in concentrated acids. Nitric acid containing a small percentage of nitrous acid was taken either alone or in admixture with sulphuric acid. The addition of hydrazine occasions an explosion, and with this exception substances such as urea, lead peroxide, oxamide, methylamine nitrate, and amido guanidine are very inert towards nitrous acid in presence of concentrated nitric acid, although they react readily in dilute solution. The observation of Franchimont that urea nitrate decomposes with evolution of carbon dioxide and nitrous oxide was confirmed.

**Zoological Society**, February 6.—Mr. G. A. Boulenger, F.R.S., vice-president, in the chair.—Mounted cubs of the timber-wolf (*Canis occidentalis*), obtained in the province of Keewatin, Canada: F. **Gillett**.—Restored models of the skulls and mandibles of *Mœritherium* and *Palæomastodon*: Dr. C. W. **Andrews**. The models were prepared by Mr. F. O. Barlow from the original specimens collected from the Upper and Middle Eocene beds of the Fayûm, Egypt, and now preserved in the British Museum and the Geological Museum, Cairo.—Lantern-slides of sections of skin from the palmar and plantar surfaces of twenty-four species of mammals, and the plantar surfaces of seven species of birds: Dr. W. **Kidd**. The functions of the papillary ridges and the papillary layer of the corium in connection with the sense of touch were alluded to.—Histology and physiology of the placenta in the Ungulata: Dr. J. W. **Jenkinson**. A recent examination

of the histological structure of the placenta in the sheep and cow has shown (1) that in the formation of the accessory cotyledons of the cow the epithelium lining the cotyledonary crypts arises by simple modification of the uterine epithelium; (2) that in the fully formed principal cotyledons of both cow and sheep there is complete continuity of the intra- with the extra-cotyledonary uterine epithelium; (3) that the greenish-brown pigment so abundantly present in the trophoblast-cells is a derivative of the hæmoglobin of the maternal corpuscles which those cells have ingested. The pigment—which contains no iron—is of two kinds, one of which has a definite absorption spectrum resembling closely that of oxyhæmoglobin. In acid solution the spectrum approaches that of acid hæmatoporphyrin.—A living specimen of a dwarf species of cavy, probably the salt-marsh cavy (*Dolichotis salinicola*): Sir Edmund **Loder**, Bart. Owing to Burmeister (the original describer of the animal) being under the erroneous impression that he had founded the species on young specimens and the fact that two distinct species occurred in the same district, some considerable confusion had been caused as to the status of the different forms of *Dolichotis*. The author pointed out that the common Patagonian cavy (*D. patagonicus*) differed from the dwarf *D. salinicola* and the larger *D. magellanicus centricola* (the two species found together) in having a broad dark band above the white rump-patch.—A description of *Trichorhiza*, a new hydroid genus: E. S. **Russell**.—Description of the new genus *Melissomorpha*, formed for the reception of a horse-fly of the Pangoninæ division of the family Tabanidæ, discovered by Colonel C. T. Bingham in Sikkim: Gertrude **Ricardo**. The insect closely mimicked the Indian bee *Apis dorsata*, L., having the flattened wide tibiae characteristic of the hive-bee, the general resemblance between the bee and the fly being very striking.—Mammals collected at Kuruman and Molopo in Bechuanaland by Messrs. R. B. Woosnam and R. E. Dent: H. **Schwann**. The specimens, numbering about 120, and belonging to 26 species, were of great interest as being topotypes of several species described by Sir Andrew Smith in his expedition to Kuruman and the interior of South Africa.—Description of a new species of ratel (*Mellivora*) from Central Africa, also notice of the occurrence of a new subspecies of chevrotain (*Dorcatherium*) in that district: R. **Lydekker**. The author proposed to divide the genus into three geographical races, viz. the typical form from the Gambia, Bates's chevrotain from the Cameroons, and the present—Cotton's chevrotain—from the Ituri Forest.—The articulation of the vertebrate jaw: H. G. F. **Spurrell**. The object of this paper is to direct attention to the existence of two types of mouth in vertebrates. In one type the articulation is in the plane in which the teeth meet; in the other type it is not in the plane in which the teeth meet, but in mammals above, in reptiles below that level. This alteration in level is attained in mammals by an ascending ramus of the jaw, in reptiles by a long quadrate bone.

**Entomological Society**, February 7.—Mr. F. Merrifield, president, in the chair.—*Exhibitions*.—Specimen of *Lathrobium laevipenne*, Heer, a beetle new to the British list, taken in a sandpit near Oxted, Surrey, in August, 1905: W. E. **Sharp**.—Specimens of South African butterflies belonging to the Nymphaliniæ, Acraeiniæ, Danainæ, and Papilioniniæ: Dr. F. A. **Dixey**. Attention was directed to the significance of the fact that scents of an agreeable nature (as in Pieriniæ generally, *Mycalasis safitza*, &c.) were as a rule confined to the male sex, while those of a disagreeable or disgusting character (as in Acraeiniæ and many Papilios) were often common to both sexes.—Four species of *Acraea* taken in South Africa during the visit of the British Association: Dr. G. B. **Longstaff**. The species were (1) *A. anemosa*, Hew., from the Victoria Falls, and Mochudi, in Bechuanaland; (2) *A. alboradiata*, Auriv., previously known to Mr. Roland Trimen by two females only, and considered by him as a variety of *anemosa*; (3) *A. atolmis*, Westw., to which Westwood gave the names of *atolmis* and *acontias*, although there seems no doubt they are one species; (4) *A. atergatis*, Westw., the two types of which are in the Hope collection at Oxford.—Two Diptera, which had been observed follow-