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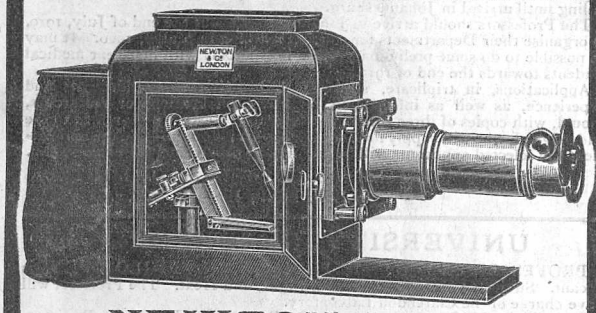

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UNEMPLOYED CHEMISTS.

In connection with the demobilisation and resettlement of Chemists who have been serving with the Forces, or otherwise engaged in war work, the Institute of Chemistry has issued notices through the Press asking companies and firms who wish to employ qualified analytical, research, or works chemists to communicate with the Registrar of the Institute, who will assist in filling vacant posts with suitable men. The notices state that "where appointments at salaries of £300 a year and upwards (with prospects) are offered, a good selection of candidates may be expected." A representative of the *Daily Chronicle* was told, "Ask us to-day for 200 chemists at £300 per annum, and we can provide them to-morrow."

The effect of these widely circulated announcements, coming from a body with the status and authority of the Institute of Chemistry, must be to make £300 the standard *maximum* salary which employers will offer, and which a fully qualified and trained chemist can expect to obtain. This sum, equivalent to a pre-war salary of less than £150, is not only a miserably inadequate remuneration for the services rendered by the chemist, but is not even sufficient to enable him to maintain a decent standard of life, much less to incur the expenses which are necessary for him to continue the scientific development on which the future of the nation depends.

Besides publicly sanctioning the notorious underpayment of a professional class which has given services of inestimable value to industry, the nation, and humanity, the Institute is undertaking to help employers to perpetuate the deplorable conditions under which our scientific work has hitherto been carried on.

In the interests not only of professional men of science, but also of national welfare and progress, the Executive Committee of the National Union of Scientific Workers feels that it is necessary to raise the strongest possible protest against the notices quoted above, and requests that the Press will assist in giving this protest a publicity equal to that of the Institute's announcements.

ERIC SINKINSON,
on behalf of the Executive Committee of the National Union of Scientific Workers.

February, 1919.

KEBLE COLLEGE, OXFORD.

NATURAL SCIENCE SCHOLARSHIP, 1919.

An examination will be held in this College on March 11 for a SCIENCE SCHOLARSHIP of the annual value of £60, with laboratory fees £20.

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UNIVERSITY OF EDINBURGH.

SUMMER SESSION, 1919.

FACULTY OF MEDICINE.

Applicants for admission to the Classes of the First Year during the Session which opens on April 15, who have not previously matriculated, are requested to send in their names to the DEAN of the Faculty of Medicine not later than March 8.

L. J. GRANT, Secretary.

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J. M. WYNNE,
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Applications are invited for the post of LECTURER in MECHANICAL ENGINEERING, at a commencing salary of £250 per annum, with increments of £25 per annum up to £300, subject to satisfactory service.

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Applications, in triplicate, stating age, professional qualifications and experience, as well as information regarding publications or researches, should, with copies of three recent testimonials, be sent by March 22 to the undersigned, who will supply further information if desired. Before appointment the selected applicants will be required to pass a medical examination.

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TWO ASSISTANTS wanted. Salary (1) £200 to £300; (2) £150 to £175. Applications, stating age, training, and experience, with any testimonials and references, should be sent to the PROFESSOR OF ELECTRICAL ENGINEERING before March 31.

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DEMOBILISED OFFICER, B.Sc., A.R.C.Sc I., seeks evening work, teaching or otherwise, Mathematics, Physics, Mechanics.—Box 188, c/o NATURE Office.

LADY CHEMIST, graduate, wanted for Chemical Laboratory.—Apply CHIEF INSPECTOR, West Riding Rivers Board, Wakefield, stating present salary.

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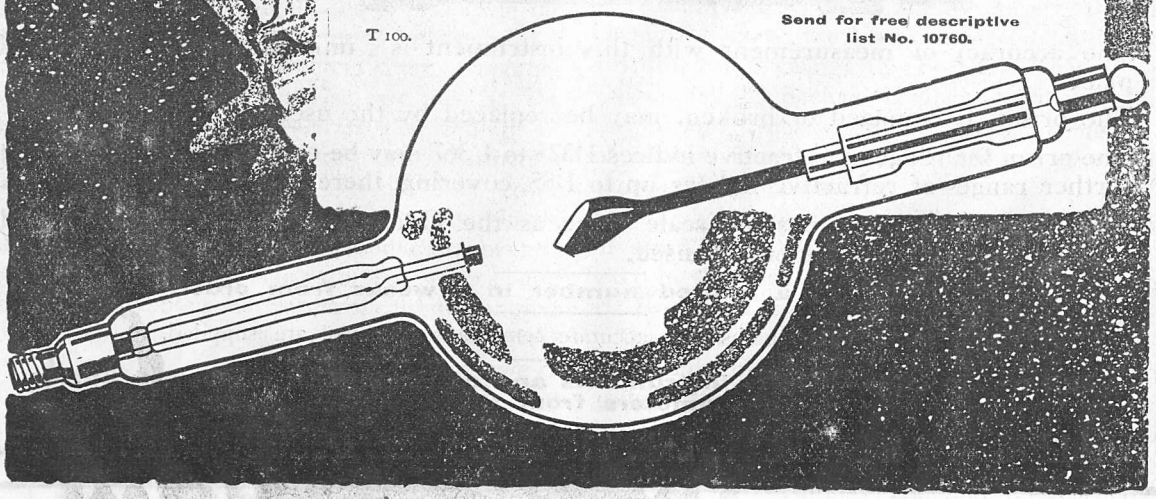

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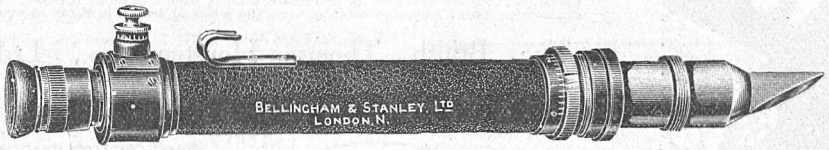

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THURSDAY, FEBRUARY 27, 1919.

THE PROFESSION OF CHEMISTRY.

THE professional status of the medical practitioner is clearly established by definite legal enactments; the public, therefore, has no difficulty in recognising those who alone are entitled to act as saviours of its health. Lawyers are almost equally clearly marked out as a class apart. But in other cases the lines of demarcation are very indefinite. Thus the term "engineer" is applied equally to the members of the engineering profession—whose standing is established through their connection with certain recognised institutions—and to the craftsman who is simply a skilled manual workman.

The term "chemist" is one of even greater vagueness. It is not only used by those who, in one form or another, are engaged in the practice of chemistry; also, through long usage, it is associated in the public mind with the apothecary, druggist or pharmacist, who both dispenses drugs in accordance with medical prescriptions and is the salesman of a considerable variety of proprietary articles. Although pharmacy is an organised, protected calling, the sale of drugs is no longer confined to registered pharmacists but is an open trade, provided always that a qualified assistant be employed in dispensing. Another class is now coming into existence, viz. the specially qualified body of apothecaries or pharmacists attached to hospitals throughout the country; these are skilled in the principles of pharmacology and in the use of drugs.

It is being recognised that, in the interests of this latter body, as well as in those of pharmacology generally, a clear distinction should now be made between the honourable calling of pharmacy and that of the chemist proper; in fact, that it would be generally advantageous to dissociate the term "chemist" from the term "pharmacist," especially as the three distinctive titles of apothecary, druggist and pharmacist are all at the disposal of those engaged in the calling of pharmacy. But, even were this distinction made, the term "chemist" would still cover far too wide a range to admit of any simple definition, beyond that of a person more or less acquainted with the principles of the science and more or less skilled in their application—ranging from the professor, in close contact with progressive knowledge, to those employed in works laboratories in carrying out some routine testing operation, such as the determination of carbon in steel, the one being a man who is a highly skilled observer and worker and has learnt to think broadly, the other merely a craftsman skilled in the exercise of certain operations.

With rare exceptions, the line of demarcation, in future, must depend upon the training received. The profession should include all those who occupy certain recognised academic positions, together with those whose course of training has been of sufficient breadth and depth to justify their admission into the Institute of Chemistry, which is clearly marked out as the main avenue of approach. Now that the Institute is recognising the evils of our examination system and is prepared to grant membership to those who can produce satisfactory proof that they have passed creditably through the necessary course of training, so that it no longer seeks to interfere with the freedom of the schools, those who have the ability and aspire to be reckoned members of the profession should have no difficulty in securing entry. No one will gain—least of all the profession of chemistry—from the recognition of any other than a high qualification. But, as unconventional, if not irregular, methods of study may sometimes be attended with better results than regular, it will be desirable to keep an avenue open to those who prove themselves to be competent, should they desire to receive official recognition.

The recent establishment of a Federal Council for Pure and Applied Chemistry, to advance, safeguard and voice the interests of chemical science, marks a step forward of great importance to the Chemical Profession. It is taken advisedly, with the object of focussing opinion and of bringing about an affiliation of interests. At present the council consists of delegates appointed by the Chemical Society, the Society of Chemical Industry, the Association of British Chemical Manufacturers, the Institute of Chemistry, the Society of Public Analysts, the Faraday Society, the Biochemical Society, the Iron and Steel Institute, the Institute of Brewing, the Society of Dyers and Colourists, the Society of Glass Technology and the Ceramic Society. In all these chemistry is of primary importance, though not in every case the dominant interest.

The chairman is Sir William Pope, president of the Chemical Society and professor of chemistry in the University of Cambridge; and Prof. H. E. Armstrong is the hon. secretary.

One of the first cares of the new council will be to promote the formation of an association or guild of the societies specially engaged in furthering the interests of chemical science and to provide adequate quarters for the conjoint labours of the various sections. A complete library for the

common use of chemists will be one of the chief features of this scheme. The step was one that was urgently called for to give dignity to the profession of chemistry and to secure for it the recognition it may justly claim from the public; it was also essential if the work of British chemists was to be carried on at the high level at which it must be maintained to meet our Imperial needs.

If we are not mistaken, the position of British chemical science is now reassuring. Gradually, during the war, the nation has been made aware that chemists have played an all-important part, both offensive and defensive; people are also more or less alive to the fact that industries in which the chemist is the leading spirit have been greatly developed. As a consequence, the popular feeling that English chemists were inferior to German has disappeared. It is certain, moreover, that the view put forward, notably by Prof. Carl Duisberg—the leading mind of the great Bayer firm—at the Perkin celebration in London, that his countrymen inherit peculiar aptitudes which must give them supremacy as chemical manufacturers, has no longer a shadow of foundation. It is now proved that English chemists are as capable as any others; that, in fact, our fault in the past has merely been that we have not given the chemist his opportunity. Yet, although academic and industrial interests have been brought into effective co-operation, with mutual good results, it is none the less clear that the approach made to an appreciation of the value of scientific method in industry and in the public service is by no means so close that the future is assured. "Science" is practically voiceless in the House of Commons; our State Departments still show too little tendency to move with the times and to give heed to expert advice, though there are signs of change even in this particular: a great work is still to be accomplished, therefore, by the schools, to develop a more sympathetic and intelligent attitude in the governing class of the near future.

CONIFEROUS TREES.

Coniferous Trees for Profit and Ornament. Being a Concise Description of each Species and Variety, with the most recently approved Nomenclature, List of Synonyms, and Best Methods of Cultivation. By A. D. Webster. Pp. xx+298. (London: Constable and Co., Ltd., 1918.) Price 21*s.* net.

CONIFERS are extensively cultivated in this country for the production of timber, for shelter, and for ornament. The number of species employed for these purposes is very great, and their discrimination is often a difficult matter, especially in the young state before they begin to bear cones. Closely related varieties or species may differ widely in value. This is well seen in the Douglas fir, the Pacific coast form of which is perhaps the most valuable conifer that has been introduced, owing to the excellent quality of its timber, of which an enormous volume per acre can be produced in suitable soils and situations in a short period of years. The Rocky Mountain form of this tree, which differs only slightly in appearance, is practically useless in this country.

Few books point out clearly the distinctive characters by which species can be identified, and there is great need for a small, handy volume which will supply concise botanical descriptions with adequate keys, and an accurate account of the natural history and uses of the conifers that can be cultivated in the open air in this country.

The present work, while handy in form, is disappointing on account of its lack of botanical details, there being no clue to the identification of the species, but scattered remarks of an indefinite kind. The descriptive part of about 200 pages is arranged alphabetically, and much attention is paid to varieties and sports which are of minor interest. Some rare species are described at length, of which living specimens are unknown in this country; for example, *Torreya taxifolia, Pinus clausa,* etc., while more important species, of which there are living examples in Kew Gardens, are omitted, as *Larix sibirica* and *L. kurilensis, Pinus armandi* and *P. leucodermis.* It is doubtful if the author has ever examined the beautiful example of Brewer's spruce, near the pagoda at Kew, judging from his remark that "this species has leaves which resemble those of the Norway spruce."

The book concludes with several short chapters, dealing mainly with the cultivation, propagation, uses, variations, and diseases of conifers. For economic planting, Mr. Webster gives notes on the species commonly used for this purpose, but includes the Nootka cypress and the Atlas and Lebanon cedars, which are rarely planted for timber in this country, while he omits the Japanese larch and *Abies grandis,* which are of considerable merit in some situations. Mr. Webster has a high opinion of the Corsican pine for timber production, and instances a plantation of thirty-two years' growth in which this tree has attained 65 ft. in height. The chapter on diseases and attacks by insects, birds, squirrels, etc., is "popular," and has some curious errors of nomenclature. The insect with a woolly covering which lives on the bark of the Weymouth pine is not a species of Coccus, being *Chermes corticalis.* The woolly aphis on the larch is *Chermes laricis,* and not *Bostrichus laricis,* which is the name of a bark beetle. The usefulness of this book for students and practical men is impaired by such errors, which are calculated to throw doubt on the general accuracy of the descriptive matter, which, nevertheless, is readable, and contains much interesting information.

BIOLOGISMS EXPOSED.

From Darwinism to Kaiserism. Being a Review of the Origin, Effects, and Collapse of Germany's Attempt at World-Domination by Methods of Barbarism. By Dr. Robert Munro. Pp. xx+175. (Glasgow: James Maclehose and Sons, 1919.) Price 4*s.* net.

DR. MUNRO is a whole-hearted selectionist, but a great part of his vigorous book is devoted to exposing the fallacy, not confined to Germany, that might is right, a fallacy which finds its theoretical foundation in a misunderstanding of Darwinism. Natural selection has worked so well, they say, in the evolution of animate Nature that we cannot do better than continue it in the kingdom of man; but, as the author reminds us, it has to be recognised that natural selection has resulted in efficient parasites, as well as in efficient Primates. It is preposterous to assume that the conditions of modern warfare represent a logical continuance of the struggle for existence as observed in wild Nature, for the sifting processes of the terrible four years that the world has wrestled through are in a different category, as Dr. Chalmers Mitchell has well shown, and have worked in great part in the wrong direction—dysgenically, not eugenically. Man cannot, indeed, hope to keep his foothold, still less make progress, without sifting, but Dr. Munro shrewdly lays bare the folly of thinking that man is shut up to Nature's methods. He must assist, improve on, or even counteract them; and civilisation has in great part consisted, as Sir Ray Lankester and others have made clear, in throwing off the yoke of natural selection. More positively, man must substitute rational, social selection for natural selection. Since Huxley's famous essay, many antitheses have been drawn between natural selection and the sifting methods which experience indicates as spelling progress for man, but there has been a tendency to conceive of Nature's tactics too crudely and without Darwin's subtlety. For Darwin quite clearly recognised that endeavours after the well-being of the family are included in the struggle for existence, as well as internecine competition around the platter of subsistence.

Dr. Munro has done a useful piece of work in once again nailing to the counter the false coin of pseudo-Darwinism, and in trenchantly exposing the shallowness of would-be "scientific" biologisms. Man is to make progress not only along the lines of the common ground which he shares with other mammals, but also along the lines of his distinctive peculiarities which make him "a man for a' that." We have not been able to do more than allude to one of the main ideas of an arresting volume, which many will heartily welcome, though they cannot agree with it all. Thus we regret to see the confident statement that "acquired peculiarities during lifetime become sometimes permanent." What proof is there?

OUR BOOKSHELF.

A School Chemistry Method. Being the Teacher's Supplement to Chemistry Notes and Papers. Parts i., ii., and iii. By G. N. Pingriff. Pp. xii+80. (London: "Geographia," Ltd., n.d.) Price 1*s.* 9*d.* net.

Chemistry Notes and Papers for School Use. (Notes and Question Papers to Supplement the Pupil's Own Laboratory Notes.) In three parts. By G. N. Pingriff. (London: "Geographia," Ltd., n.d.) Price 2*s.* 3*d.* net each.

IN "A School Chemistry Method" an attempt is made to overcome the well-known difficulty of preaching from another man's notes by the issue of a companion booklet explaining the author's method. This part of the work will be found useful, though the first chapter, on "The Aims of Science Teaching," is either not necessary, since the book is intended only for teachers of chemistry, or, alternately, must be considered to be by implication a rather severe indictment of that part of the teaching profession. The remainder of the book explains the manner in which the author intends "Chemistry Notes and Papers" to be used. It must, however, be noted that there are also a detailed syllabus of the course, a list of essay subjects, well graduated and not too difficult, a key to the exercises—both practical and numerical—and a short selection of books suitable for the science library.

The "Chemistry Notes" are made up in twenty-four loose sections, perforated, and fastened together temporarily. The pupil is supposed to make his own text-book from the results of his practical work, and at intervals a section of the notes is to be inserted in this book following some practical work leading up to the subject-matter of the section. The notes are brief, but interesting, and they cover a wide range of topics.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Neglect of Biological Subjects in Education.

THE two recent letters in NATURE (January 23 and February 6) under the above title expose a defect in our science teaching which has been plain to me for some years. Hitherto I have refrained from referring to this publicly owing to my lack of authority in educational matters, but I now feel emboldened not only to acknowledge my hearty agreement with the views expressed in these two letters, but also to venture upon a few remarks of a critical nature on a concrete case of science teaching, viz. that of the University of Cambridge. When I took the Natural Sciences Tripos the student had a free choice of subjects (and I fancy the same still holds), selecting usually three or four; none were compulsory. Thus a candidate could graduate in high honours in natural science and yet be totally ignorant of biology. The converse could also occur—for example, by taking

zoology, botany, and physiology, the physical sciences could be shirked altogether. The latter course was, perhaps, rarely pursued, but the former, I imagine, must have been commonly followed. It is gratifying to find that at last natural science is to receive a much overdue recognition in the Cambridge Previous Examination, and, though the exact details are not yet to hand, one fervently hopes that both branches, the physico-chemical and the biological, will be included and made obligatory for all students.

It appeared to me in the past that the Cambridge medical student who took the Tripos along with his M.B. examinations received (in theory, at any rate) the broadest education in science that the University had to offer; for in his first M.B. he was obliged to take both physics and chemistry as well as biology. It thus struck me that some such examination should have been made universal for all honours candidates in natural science. Now that science is to be introduced into the "Little-go," the necessity for such an intermediate examination may be less urgent, though one doubts if the need is entirely removed. A further test to ensure a grounding in, not a mere smattering of, all the principal sciences would seem desirable. Then the actual degree examination could have a more restricted range, and at the same time be of a more advanced character than it is presumably at present. Part II. of this Tripos could then be more circumscribed as to its subject-matter, and might with advantage consist partly of a training in research. Surely, for instance, the whole domain of either physics or chemistry is too vast a field for anyone adequately to explore and master with profit for a single examination.

Little change, I surmise, beyond the abolition of that irritating second subject in Part II., has taken place in the Natural Sciences Tripos since the early 'nineties, when I was closely familiar with it. If a radical reconstruction be not feasible, may I plead for a greater selection of subjects for Part II. by the introduction of border-line ones? By way of illustration, let me refer to one of these—biochemistry. Have not the watertight-compartment system and the lack of breadth in the elementary training arising from the option of subjects acted adversely on the output of biochemical research (at any rate, as applied to plants) by the Cambridge school? For instance, the newly fledged botanist who may desire to research in plant physiology from the chemical side is often hampered at the start from his lack of knowledge of, and want of practice in, organic chemistry. The chemist, on the other hand, through being allowed to ignore biology in his training, may not only feel himself unfitted to tackle biochemical problems, but may even be unmoved by them; and yet from his familiarity with organic chemistry he may be quite competent to attack them from this side. The introduction of a subject in Part II. embracing, say, organic chemistry and the physiology of animals or plants (or both, if not too extensive) would tend to produce men thoroughly equipped to undertake biochemical research. Surely here the harvest is great, but the labourers still are few.

JOHN PARKIN.

The Gill, Brayton, Cumberland, February 8.

Arthur Eckley Lechmere and Science at Ruhleben.

THE sad news of the premature death on February 14 of Dr. A. E. Lechmere prompts me to write a few words on what this distinguished and promising biologist was to us at Ruhleben. It was the writer's privilege to collaborate with Dr. Lechmere and others in the building up of that little oasis in Ruhleben, the natural science laboratories.

Unique as an institution—science laboratories in an internment camp—unique also in their aboriginal primitiveness—the hay-loft, and later the horse-boxes, of the oldest and most ramshackle stable in the camp—they became in course of time quite well equipped, and the scene, not only of steady and systematic teaching and study, but even of research.

The history of the science laboratories at Ruhleben is the history of a development in the face of powerful internal and external opposition, and may be said to have reached its climax on the occasion of the Natural Sciences Exhibition in September, 1918, when the laboratories of Ruhleben were thrown open to the "general public" of the camp and proved themselves the greatest popular attraction that the camp had experienced, receiving in due course the patronage also of the commanding officer and his staff.

Of all those who worked assiduously for the cause of science in Ruhleben, Dr. Lechmere was alike the most distinguished and the most enthusiastic. A keen worker and a true lover of science, he was at the same time a man of extraordinary versatility. He was qualified as an electrical engineer, and at Ruhleben, besides inaugurating and leading the biological department, he devoted considerable time and thought to artistic bookbinding and to the designing and finishing of dresses and decorations for the Ruhleben stage.

During his four years at Ruhleben Dr. Lechmere gave numerous popular lectures to large audiences on biological subjects of general interest, such as evolution, parasitic diseases, inoculation (at the time of the smallpox scare), "Some Monkeys and Man," etc., generally illustrated with lantern-slides, most of which were made by himself at Ruhleben. In the biology laboratory itself he was always at work, and found in the small pond situated in the middle of the playing-field a plentiful reservoir for, in particular, microzoological study.

The writer speaks as a layman on the subject of biology, but he can safely assert that the biology laboratory, with its first-class microtome, its stock of fine microscopes, its excellent electrically regulated thermostats, was an achievement that the camp could be proud of, and Dr. Lechmere himself loved the place and practically lived in it.

As the laboratory accommodation and the facilities grew, the contact between the various branches of natural science became more close, geology, chemistry, and physics all having a large number of students. Thus laboratory work could be found in all branches for students of natural science, and we may say that nothing could have been more harmonious than the co-operation of all the science departments of Ruhleben Camp School.

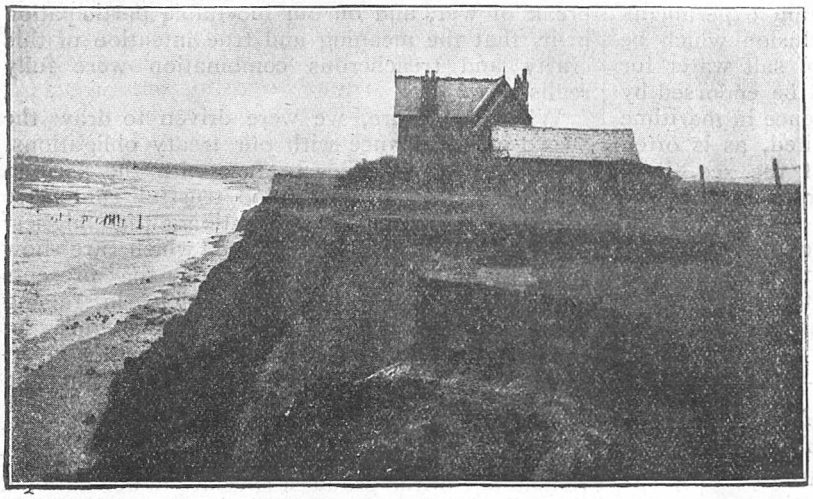
Space here does not admit of a description of the exhibition; may it suffice to say that one could occupy several hours profitably in passing through and observing the various exhibits and the experiments being carried out; it was noted that its effect was to stimulate energetically the interest of the general public in natural science.

To this achievement of the sciences in Ruhleben Dr. Lechmere contributed the largest share, and contributed it with that extraordinary grace and with that infinite kindness which were his. He was often in bad health. The severe winters in almost unheated barracks told on him. But he stuck to his task under the most trying conditions. To his colleagues and friends at Ruhleben, to the students who profited by his wonderful teaching and lecturing, many of whom are now pursuing their studies at our universities—to all these his untimely death, coming so soon after his return to England, is deeply tragic.

J. W. B.

SEA AGGRESSION.[1]

THE appearance of a second edition of Prof. Matthews's book on "Coast Erosion and Protection" is testimony to the value of the publication, and, at the same time, to the concern which has been aroused of late years over the continued inroads of the sea on the shores of this country, and the much debated responsibility of the State for the preservation of its coastline. The erosion of the littoral, and particularly that part which fringes the eastern and southern counties of Great Britain, has been an evident process for centuries, but it is only recently that its cumulative effects have become realised, to such an extent, indeed, as to excite a feeling of consternation on the part of those whose property is threatened with obliteration. In 1906 a Royal Commission was appointed to investigate the situation and to advise as to the best means of preventing further depredations. Its recommendations were embodied in a final report issued in 1911. To put the matter briefly, it repudiated the contention of national liability, but approved the establishment of a central authority for the care and administration of the coastline, and suggested the conferment of powers upon the Board of Trade to prevent the unauthorised depletion of shingle beaches.



Photo] [*Spurr, Bridlington*

FIG. 1.—General view of Holderness Coast, showing erosion. From "Coast Erosion and Protection."

As engineer to the Municipality of Bridlington, on the Holderness coast of Yorkshire, where erosion has been perhaps more marked than in any other part of the British Isles (between Flamborough Head and Spurn Head there is a recession of 7 miles, of which 3½ miles have probably been wasted since the date of the Roman invasion), Prof. Matthews had unique opportunities of studying the subject, particularly as it fell to his lot to carry out protective works to secure the township from further encroachments. The measures which he adopted, and the designs which he prepared and executed for the walls on the sea-front, are fully described, and the details will be extremely valuable for reference by those who have similar problems to face. The volume, however, is more than a merely local survey; useful particulars are given of work carried out at other coast towns —Hartlepool, Folkestone, and Hastings, for instance—and there is some description of protection works on the coast of Holland. Groynes are illustrated, as well as sea-walls, and there is an interesting investigation, with a description of experiments carried out by the author on small-scale models, into the effect of projections in the coastline on the travel of sand and shingle.

The book is profusely illustrated; in less than 200 pages of printed matter there are as many as 166 figures, including thirty photographic plates. Some very effective snapshots of storm waves are included among them, of which Fig. 2 is an example. It enables some idea to be formed of the tremendous force of wave impact; sufficient to try the stability of carefully constructed walls of solid masonry, the effect on unprotected cliffs of chalk and clay can readily be imagined.

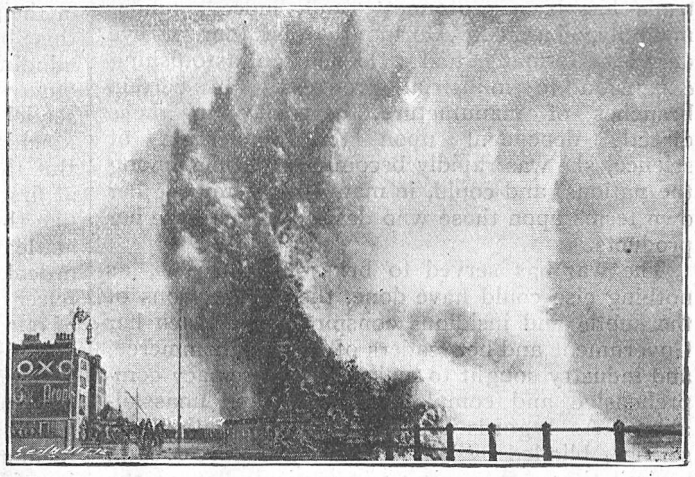


FIG. 2.—Storm wave at Hastings, October 1, 1911. From "Coast Erosion and Protection."

The arrangement of the book, embodying as it does a series of articles contributed at different

[1] "Coast Erosion and Protection." By Prof. Ernest R. Matthews. Second edition, enlarged. Pp. xvi+195. (London: Charles Griffin and Co., Ltd., 1918.) Price 12*s*. 6*d*. net.

times to engineering journals and to the proceedings of technical societies, is possibly susceptible of some slight improvement in co-ordination, which will no doubt receive consideration in future editions, and so bring it up to the admirable standard of the subject-matter.

A chapter is devoted to a consideration of the action of sea-water on cement, in which the author details the results of certain experiments which he carried out. The conclusion which he arrives at in regard to the use of salt water for mixing is scarcely one which will be endorsed by all engineers who have had experience in maritime works. When concrete is deposited, as is often the case, beneath the surface of the sea, in a viscous condition, it is a matter of indifference whether it has been mixed with fresh water or with salt—the salinity of its environment is bound to permeate it before it has time to set. This consideration applies equally to mass work deposited at low water in tidal situations.

BRYSSON CUNNINGHAM.

SOME DEVELOPMENTS IN BRITISH INDUSTRY DURING THE WAR.

IT is, of course, too soon to attempt to gauge the full effect of the great war upon the development of the world's industries, or to seek to determine how it will ultimately affect the relative position of the belligerent nations as trading communities or their respective influence upon international commerce. But there can scarcely be a doubt that with the defeat of the Central Powers, and the consequent upheaval in their social and political status, the centre of gravity, as it were, of the whole system of the world's trade has been profoundly, and, indeed, fundamentally, changed. During the last four or five decades Germany had achieved an astonishing expansion in industrial progress. In certain branches of manufacture, especially in those directly dependent upon the application of science, she was rapidly becoming supreme among the nations, and could, in many cases, impose her own terms upon those who desired to purchase her products.

The war has served to bring home to us, as nothing else could have done, the ramifications of the subtle and insidious conspiracy by which her Government and her leaders of finance, commerce, and industry sought to make that supremacy comprehensive and complete, assured and unassailable. As regards the technical applications of science, blinded by her unquestioned successes in assimilating and turning to practical account the discoveries of more creative nations, she had lulled herself into the belief that she had nothing to fear from any of her trade competitors, certainly not from this country, from whom she had appropriated and steadily exploited certain "key" industries. Furthermore, she had persistently, by methods fair and foul, sought through the course of years to obtain control of the principal sources of important raw materials, especially of such as are essential in modern warfare or necessary for the welfare of her people in such a war as she contemplated. She had studiously contrived also that this control should work to the disadvantage of this country in case we should be drawn into the struggle. This latter fact might be illustrated by a hundred examples culled practically from every oversea Dominion. It was only on the outbreak of war, and on our inevitable participation in it, that the meaning and true intention of this crafty and treacherous combination were fully realised.

When, therefore, we were driven to draw the sword in compliance with our treaty obligations, we were suddenly face to face with the peril in which we stood from a too trustful confidence in the integrity of a nation the highest ethical and political ideals of which are now seen to have been based upon the precepts and practices of a dynasty which, in raising it to power with a ruthless disregard of every moral consideration, at length overreached itself, and involved itself in ruin and its people in disaster. How we grappled with this peril and overcame it has been the wonder and admiration of the civilised world, and will ever remain one of the proudest episodes in our national history. Nothing in our existence more strikingly exemplifies the innate qualities and genius of our race. For years past it was the confident belief of the intellectuals of Germany that we were a decadent people, that we had lost our old-time virility and were enervated by wealth and material success. To those who only superficially knew us, and were, moreover, biassed by a predisposition to exalt themselves and to regard more the motes in other people's eyes than the beam in their own, there might appear some ground for this belief. We were too much concerned in minding our own business and in seeking to solve our own social problems to pay the heed that the sequel showed we ought to have done to the Machiavellism of our cunning and deceitful foe. But the shock of war brought a rude awakening, at first to us, and ultimately to our enemies. We, like them, have been tried as in a furnace, and we at least have come triumphantly through the ordeal, welded, strengthened, and ennobled, with purer ideals and a larger and richer conception of our place and destiny in the world. The beaten and disillusioned foe will, we may hope, be no less bettered by the fiery trial; bruised with adversity, her pride fallen with her fortune, and her "swashing and martial outside" a hateful memory, let us trust that she will throw down her false gods. In that case, what we learned to know and to respect in the Germany of old will not be wholly destroyed; we may hope it is too ingrained in the national character not to reassert itself, and that it will bring her once more within the comity of nations.

The true story of this most momentous episode will tax the insight and imagination of successive historians for centuries to come, for the world has never witnessed the like of it, and will, we trust,

never see its repetition. Civilisation has at length risen, as never before, to the conception that such a method of settling national aspirations or international disputes is an affront to the common sense of humanity, and that it ought not to pass the wit of man to devise some more rational means of composing them. What the method is to be is the great problem, for a solution of which the whole world waits with anxious expectation.

In analysing the conditions and circumstances which have determined the issue of this great struggle the historian must necessarily have regard to the genius, mentality, and characteristic attributes of the contending nations, for, in the long run, they are the main factors which tell for success. In this age of printing and of meticulous care in the preservation of public documents he will not be gravelled for lack of matter. We have already almost countless memorials and *mémoires pour servir*. Among them we may cite a stimulating paper by Mr. F. G. Kellaway, M.P., on "Some Developments in Industry during the War," addressed to the Industrial and Reconstruction Council, and published in an abridged form in NATURE of January 30. Even on its own subjects it is by no means exhaustive. But *ex pede Herculem*. We may judge of the whole from the specimens. And Mr. Kellaway's specimens are admirably typical and illustrative of the point which we desire to enforce: that it was to the inborn qualities of our race, its courage and tenacity of purpose, its resourcefulness and power of initiation, its inventiveness, adaptability, and steady determination to "win through," in spite of every obstacle, setback, or difficulty, that brought us victory in the end and crushed the greatest crime against humanity the world has ever known.

The war, in the Prime Minister's phrase, quoted by Mr. Kellaway, has been as "a star-shell illuminating the dark places in our national life." It has "revealed with pitiless accuracy the defects in our industrial equipment." It is the purpose of the paper to show how, as the result of the war, many of these defects have been overcome, and that the United Kingdom, as a consequence, is now first in the world in almost every sphere of industrial effort. As we have already reproduced the main part of Mr. Kellaway's interesting paper, it is unnecessary to go into any great detail now concerning its contents. Its author shows how we have incidentally wrested from Germany her predominant position in electrical industry, and once more secured the control within our own Dominions of such vital materials as mica, tungsten, and chromium (for the manufacture of high-speed steel, armour-piercing shells, the wearing parts of aeroplane engines and gears in motor vehicles, stainless cutlery, and rustless steel). Tungsten and chromium were among the non-ferrous metals of which Germany had managed to capture the main sources of supply. We are told that before the war the British Empire produced 40 per cent. of the wolfram ore, but so successfully had Germany secured the trade that no British manufacturer had been able to establish the industry in this country. "At the outbreak of war one of the two firms endeavouring to manufacture in this country was only able to keep going with difficulty, and the other only succeeded in keeping its works going by entering into a contract to supply the whole of its output to Messrs. Krupp, of Essen." We have changed all that. British manufacturers are now in a position to deal with all the ore produced within the British Empire, and could, if necessary, convert the whole world's output into tungsten metal or ferro-tungsten. A similar result may—and, if we are wise, certainly will—follow in the case of zinc, which occupies the third place in importance among the non-ferrous metals, and of which Germany, owing largely to the control she had secured over the Australian concentrates, was the largest European producer, 77 per cent. of that which we needed being imported by us from her. Australia will no longer supply Germany with her zinc ore, and the British Empire bids fair to share with America the bulk of the zinc production of the world.

Even if space had permitted, it is unnecessary, for the reason already given, to dwell in any detail upon the other instances which Mr. Kellaway adduces of England's "wakening up" and of the rousing of her energies as the consequence of the call to arms. Official control, co-operation, and combination of effort unquestionably accelerated and facilitated the introduction of improvements in organisation, management, and practice, and have exerted a permanent influence upon industries which have been pressed into the service of war. It is seen in its effect upon the manufacture of machine-tools; in a vast improvement in machinery; in increased accuracy of work as a result of the necessity for organising the production of interchangeable repetition work; in improved methods of shop transport; and in a wider appreciation of the value of scientific knowledge in machine construction.

In no department is this more marked than in aircraft work. The experience of the war has effected nothing less than a revolution in this industry. A single instance must suffice. As Mr. Kellaway states, modern warfare, no less than much of modern transport, and, indeed, of modern industry in general, is dependent upon the magneto. "In the air it is an essential source of power and movement." Our position in 1914 with regard to the production of magnetos was exceedingly grave. Practically everything needed to make them in sufficient quantity was not procurable in the British Isles, and it required months—nay, years—of effort to surmount our difficulties. But they have been surmounted. "Instead of one firm producing only 1140 magnetos in a year, as was the case in 1914, we now have some fourteen firms producing 128,637 magnetos in a year. . . . It is not only that we are producing in quantity which makes us independent of outside sources; the quality of the British magneto is the highest in the world. It is lighter in weight and

more reliable in service than the Bosch magnetos manufactured before the war, or than the latest examples found in captured German aeroplanes."

"It is thus not only on the field," adds Mr. Kellaway, "that we have beaten the Bosch." What is true of the magneto is equally true of the ignition-plug. In 1914 three firms were producing a yearly output of not more than 5000 plugs. By October 31, 1918, the yearly output of five firms had risen to 2,148,725, and they were being supplied, not only to our own Services, but also to our French, Italian, and American Allies.

The story of the influence of the war upon our glass industry, and especially upon the manufacture of scientific and optical glassware, is no less inspiriting. Germany has once more been beaten at Jena. But it will scarcely be credited that at the outbreak of war a considerable part of our artillery was equipped with gun-sights exclusively "made in Germany"—the dial sight No. 7 of Goerz. There is much that needs clearing up concerning the pre-war methods of the War Office, and surely this is a case in point. That we should have become dependent upon a potential enemy for so essential a piece of mechanism as a gun-sight is surely one of the most astonishing instances of departmental ineptitude that could be conceived. But it is reassuring to be told that the resourcefulness of our opticians has been equal to the nation's emergency. The British sight is described as "a beautiful and delicate piece of work, and its production in such numbers, and in a perfection which Germany never exceeded, is a triumph for British skill."

NOTES.

THE achievement in wireless telephony recorded in the daily Press during the past few days is by no means unique. It is reported that Mr. Daniels, Secretary of the U.S. Navy, successfully telephoned a wireless greeting to President Wilson on board the *George Washington* when the vessel was more than eight hundred miles out at sea. According to a paper presented before the American Institute of Electrical Engineers, wireless and wire telephone systems can be linked so that the human voice will perform one lap of its journey over wire and the next lap through the ether to its final destination, while the replying waves will travel the air waves first and then proceed on wire. The operation of transferring sound from wire to air can be accomplished by a device similar to the repeater now used in long-distance telephony. Latest developments in connection with the wireless telephone would suggest the latter as an excellent supplement of wire systems. As a rival, however, it has not yet reached the stage when its claims can be considered seriously, partly because of the lack of secrecy involved in its use.

PROCLAMATION is made that the unlicensed importation into the United Kingdom is prohibited of the following articles:—All derivatives of coal-tar generally known as intermediate products capable of being used or adapted for use as dyestuffs, or of being modified or further manufactured into dyestuffs. All direct cotton colours, all union colours, all acid wool colours, all chrome and mordant colours, all alizarine colours, all basic colours, all sulphide colours, all vat colours (including synthetic indigo), all oil, spirit, and wax colours, all lake colours, and any other synthetic colours, dyes, stains, colour acids, colour bases, colour lakes, leuco-acids, leuco-bases, whether in paste, powder, solution, or any other form.

THE municipality of Le Havre, by a resolution of September 11, 1918, established the Institut Océanographique du Havre and appropriated funds for its maintenance. This places on a secure and public foundation the institute and laboratory of the University of Caen at Le Havre, and it will be conducted by the same staff, to the efforts of which during the past few years this last success is due, namely, the director, Dr. A. Loir, medical officer of health; the head of the laboratory, Mr. H. Legangneux; and the superintendent of biological research, Mr. E. Peau. Daily observations on the temperature and condition of the water, and on its bacterial, planktonic, and general biotic content, will be recorded at three fixed points, with the co-operation of naval officers. Other observations will continually be made at the French and British naval stations in the port, by permission of the respective commanding officers. Results of scientific and practical importance have already been obtained, and will now increase in number and extent.

MR. R. C. J. SWINHOE, of Mandalay, has presented to the Geological Department of the British Museum a collection of red amber from Burma, sometimes known as burmite, which contains the remains of a remarkably interesting insect fauna. The material has been examined by Prof. T. D. A. Cockerell, who has published in *Psyche* and in the Annals of the Entomological Society of America the descriptions of thirty-one new species, five of which are types of new genera. Most of these were contained in a block of amber rather larger than a man's fist; this has been cut into slices about half an inch thick, and every one of them is crowded with insect remains. There are representatives of Hymenoptera, Hemiptera, Homoptera, Diptera, Trichoptera, Coleoptera, Termites, Acarina, and Diplopoda—in fact, ants are about the only kind of insect the absence of which is conspicuous. The amber occurs in clay beds of Miocene age, but it was washed into them from higher levels, and may be much older. This is certainly the most important addition made of recent years to the very large collection of insects in amber already preserved in the department. It is unfortunate that the deep colour of the amber renders it very difficult to exhibit the specimens so that their contents can be seen by the public.

IN many cities of the United States there are historical societies which have organised museums illustrating the history of the State or locality, but there is no central museum of national history. So, too, there are many museums of art, well known for their treasures and their enterprise, but such collections as pertain to the National Gallery of Art are provisionally housed in one of the halls of the Natural History Museum. It is, therefore, good news that on January 29 a Bill was introduced by Congressman Hicks in the House of Representatives to provide for a national museum of history and the arts, and it was a happy thought of his to propose such an institution as a memorial to Theodore Roosevelt. The idea is one that would have commended itself to that wide-reaching, enthusiastic, and patriotic spirit, for it is intended to assemble and display, not merely relics illustrating the personal and political history of the United States, but also such objects as

will elucidate all the cultural development of the nation. Thus the museum will comprise, in addition to the collections of fine art and the national portraits, exhibits elucidating the evolution of all the arts and crafts and their application to all branches of human activity. The same applies to the application of science to the industries and the exploitation of the natural resources of the country—a subject in which Mr. Roosevelt took a profound and practical interest. It is proposed that the building shall be erected in Washington. We wish the scheme all success.

SUMMER time will be brought into force this year on the morning of Sunday, March 30, and will continue until the night of Sunday-Monday, September 28–29.

WE announce with much regret the death on February 19, at eighty-five years of age, of Dr. F. Du Cane Godman, F.R.S., trustee of the British Museum, and distinguished for his work in natural history, especially ornithology.

WE notice with regret the announcement of the death, in his fifty-seventh year, of Lt.-Col. A. M. Paterson, professor of anatomy in the University of Liverpool since 1894, and ex-president of the Anatomical Society of Great Britain and Ireland.

THE Linen Industry Research Association of Belfast is about to appoint a director of research at a salary of not less than 1co*l*. per year. The selected candidate will be expected to make a survey of the entire field of research in the linen industry, to draft a programme of research, and to organise and supervise the carrying out of the scheme.

DR. T. A. HENRY, superintendent of the laboratories at the Imperial Institute, London, has been appointed director of the Wellcome Chemical Research Laboratories, London. Dr. F. L. Pyman, the former director of these laboratories, has accepted the professorship of technological chemistry in the College of Technology, University of Manchester.

IT is intended to hold a discussion on "Metrology in the Industries" at the meeting of the Physical Society on Friday, March 28, at the Imperial College of Science, South Kensington. Sir R. T. Glazebrook, Director of the National Physical Laboratory, has promised to introduce the discussion, and it is expected that several of the leading authorities on fine measurements will take part.

THE fifth lecture of the series arranged by the Industrial Reconstruction Council will be held in the Saddlers' Hall, Cheapside, E.C.2, on Wednesday, March 5. The chair will be taken at 4.30 by Sir George Riddell, Bart., and a lecture entitled "Industrial Changes Caused by the War" will be delivered by Prof. A. W. Kirkaldy, University of Birmingham. Applications for tickets should be made to the Secretary, Industrial Reconstruction Council, 2 and 4 Tudor Street, E.C.4.

NEXT Tuesday, March 4, Prof. H. Maxwell Lefroy will deliver a lecture at the Royal Institution on how silk is grown and made—mulberry silk, and on March 11 on insect problems. The Friday evening discourse on March 7 will be delivered by Prof. H. C. H. Carpenter on the hardening of steel; on March 14, Prof. A. Keith on the organ of hearing from a new point of view. On Saturday, March 8, Sir J. J. Thomson will give the first of a course of six lectures on spectrum analysis and its application to atomic structure. Prof. Hele-Shaw's lectures on "Clutches," announced for March 4 and 11, are unavoidably postponed until after Easter.

WE regret to record the death of Mr. Henry Bell Wortley on February 17. An account of his career appears in the *Engineer* for February 21. Mr. Wortley was a member of the firm of steamship owners, Alfred Holt and Co., of Liverpool, and was fifty-one years of age at his death. He was trained as a naval architect with various firms on the Tyne, and after joining the Liverpool firm he was responsible for new features in the design of many ships belonging to the Holt Co. Mr. Wortley was a member of the Institution of Civil Engineers and the Institution of Naval Architects. During the war he took an active part in placing Liverpool in the forefront as a munition-producing area.

THE next ordinary scientific meeting of the Chemical Society will be held at Burlington House on Thursday, March 6, at 8 p.m., when Prof. J. W. Nicholson will deliver a lecture entitled "Emission Spectra and Atomic Structure." It was announced at the meeting held on February 20 that the following changes in the list of officers and council had been proposed by the council:—*President:* Sir James J. Dobbie. New *Vice-Presidents:* Dr. H. J. H. Fenton and Prof. James Walker. New *Ordinary Members of Council:* Mr. J. A. Gardner, Prof. F. E. Francis, Dr. C. A. Keane, and Sir Robert Robertson. The anniversary dinner of the society will be held in the Connaught Rooms, Great Queen Street, W.C.2, on Thursday, March 27, at 6.45 for 7 o'clock.

WE extract from the *Lancet* the following obituary notice of Prof. R. Blanchard, who died on February 8 at sixty-one years of age. Prof. Blanchard had occupied for long the chair of parasitology at the faculty of medicine in Paris, and his great reputation in France and abroad was due to his works on medical zoology, and particularly to his researches on the animal carriers of pathogenic germs and their *rôle* in the propagation of epidemics. The "Traité de Zoologie Médicale," in two volumes, first appeared in 1886–90. At the time of his death he was engaged on the great task of a history of medicine, and had made some progress in the publication of a *corpus inscriptionum* devoted to medicine and biology. His diligence was incredible. Prof. Blanchard was secretary to the Academy of Medicine, and he founded the French Society for the History of Medicine, the Colonial Institute of Medicine, and the French Congress of Zoology. For twenty years he acted as general secretary to the Zoological Society of France. Owing to the part which he took at several of the International Congresses of Medicine he became a well-known figure abroad.

MATHEMATICIANS and astronomers will learn with much regret that news has been received through a correspondent in Stockholm announcing the death of Alexander Michailovitch Liapounoff. He is said to have died at Odessa by his own hand as a result of the Bolshevist *régime*, but we have no means of confirming the report. Liapounoff held the chair of applied mathematics in the Petrograd Academy. His more important papers were published mainly in the Memoirs of the Academy and in Liouville's Journal. Unfortunately for English readers, a number were written in Russian, only summaries and abstracts appearing in French. His earlier work lay in the direction of broad, general theorems in hydrodynamics and the theory of gravitating masses. His later, and perhaps best-known, work dealt with the stability of the pear-shaped figure of a rotating mass of liquid, a problem of the first importance to theories of cosmogony. Poincaré had developed a method for the analytical discussion of the problem in 1901, but

did not carry out the necessary calculations in detail, and so reached no definite conclusion. In 1902 Sir G. Darwin announced that he had proved the pear-shaped figure to be stable, but this announcement was followed by a paper from Liapounoff in 1905, in which it was claimed that the pear-shaped figure was unstable. Liapounoff's work was distinguished by the combination of clear physical insight and masterly analytical skill.

INFLUENZA has again further increased in severity over the British Isles, and the Registrar-General's return for the week ending February 15 shows the deaths in London (County) to be 273 due to the epidemic. Forty-eight per cent. of the deaths occurred at the ages from twenty to forty-five, so that the death incidence is similar to that when the present epidemic was most virulent at the commencement of last November, the complaint attacking most severely the strong and able-bodied. Influenza caused 13 per cent. of the total deaths during the week ending February 15, pneumonia 13 per cent., and bronchitis 16 per cent.; in the early part of November influenza caused 57 per cent. of the deaths from all causes, but deaths from pneumonia and bronchitis were not very different from those at present. In the ninety-six great towns of England and Wales, including London, there were 1363 deaths during the week from influenza, and since the commencement of the epidemic in October last there have been 48,736 deaths, whilst in London there have been 12,286 deaths. The total deaths in any previous epidemic in London have only amounted to about 2000. The present is the twentieth week of the epidemic, five of the previous epidemics having continued as long, and the epidemic from October 1904 to April 1905 continued for twenty-six weeks, but in London during the whole time the total deaths from influenza were only 707, and the maximum number in any week was only forty-five.

AN interesting note is contributed to the German weekly scientific paper, *Die Umschau*, for November 30, 1918, by the editor, Prof. J. H. Bechhold. Prof. Bechhold indicates the manner in which German science can aid the Fatherland in its hour of defeat and assist it to gain the supremacy in the economic sphere. After pointing out that reconstructed Germany must perforce be simple in order to conform to the new conditions of life imposed upon her by recent events, he asks the question: In what relation shall science, technics, and art stand in the new State? Germany, it is explained, must in future seek to live upon her own resources; further, she will have only a small amount of raw material surplus to her own needs, and for this reason it will be incumbent upon her to export the output of her genius; to meet the situation as it should be met, Germany will have to build herself up on efficiency management. She is told that she must attempt to excel all other countries in the quality of her precision instruments and lenses, artificial silks and textiles, dyes and medicines, high-class furniture and works of art, in order to create a demand for these valuable products of her industry in foreign lands. For this reason, Germany will require, says Prof. Bechhold, highly trained engineers, chemists, electricians, skilled mechanics and artificers, and, in order that her needs in these directions may be suitably met, she will further require first-class teachers, first-class training institutions and research laboratories, as well as colleges. These matters are, it is stated, of such overwhelming importance that they must not be permitted to become a class or caste question; there is little danger of this at the present time, for already the intellectual men in Germany are combining forces in various directions: this is so in the case of the technical man and the academician, as well as in that of the artificer and the university professor. Finally, an inventors' institute must be founded in order that the inventor may be furnished with advice, the commercial possibilities of his work tested, a selection made of what is best, and a good market found for that which is of real worth. Prof. Bechhold evidently intends that German science shall make a mighty effort in order that Germany in defeat may prove herself as formidable in the economic sphere in the future as ever she was before her great downfall.

MR. ARTHUR L. LEACH has published an account of the prehistoric remains in the museum at Tenby. An interesting series of adinole and flint implements was acquired from the Hoyle Cave. Mr. Leach maintains that the relics found in the caves on Caldey Island prove that it was connected with the mainland when the mammoth, rhinoceros, and reindeer were the characteristic fauna of this region, a connection which lasted until Neolithic times. The collection includes many later remains of the Bronze and Romano-British periods. A little rock-shelter, Nanna's Cave, in the Isle of Caldey, the earliest inhabited site which can be approximately dated, was occupied between about 250 and 400 A.D.

THE measures for the reformation of the numerous wandering criminal tribes which pervade northern India, and are a serious menace to the cultivating classes, have long engaged the attention of the Government. A fairly satisfactory report of the establishment of a reformatory settlement at Amritsar, in the Punjab, has recently been published. The mortality among these people, accustomed to eat carrion and food cooked in an unwholesome way, has been excessive. On their arrival at Amritsar much dismay was caused among them by the discovery that a gallows still stood in one of the jail yards. But they soon became reconciled to their new environment, and many of the younger members have shown an unexpected aptitude for industrial work in the woollen mills. The only remedy is to intern these pests of Indian society, and the experience of the Amritsar settlement shows that, under judicious, kindly officials, the younger members at least of the gangs may be trained to abandon their criminal nomadic life, and accustom themselves to industry.

MR. T. A. JOYCE describes in the January issue of *Man* a remarkable wooden stool recently acquired by the British Museum from the island of Eleuthera, Bahamas. Objects of wood from the West Indies are by no means common, and specimens from the Bahamas are exceedingly rare. From one of the shorter sides of the seat of this chair projects a knob, which has been carved to represent a grotesque human head, of which the eyes and mouth have evidently at some time been emphasised by inlay, probably of shell. These State chairs were used for a honorific purpose, for chiefs and other distinguished persons. A compliment of this kind was paid to a party sent by Columbus to visit a Cuban prince. The Museum already possesses examples of wooden objects of Taiman workmanship of very great importance, including a stool from Cuba of very unusual type. The new specimen is an interesting and important addition to the collection.

IN the course of some "Notes on Birds Observed near Dunkerque," published in *British Birds* for February, Mr. H. F. Witherby makes some extremely

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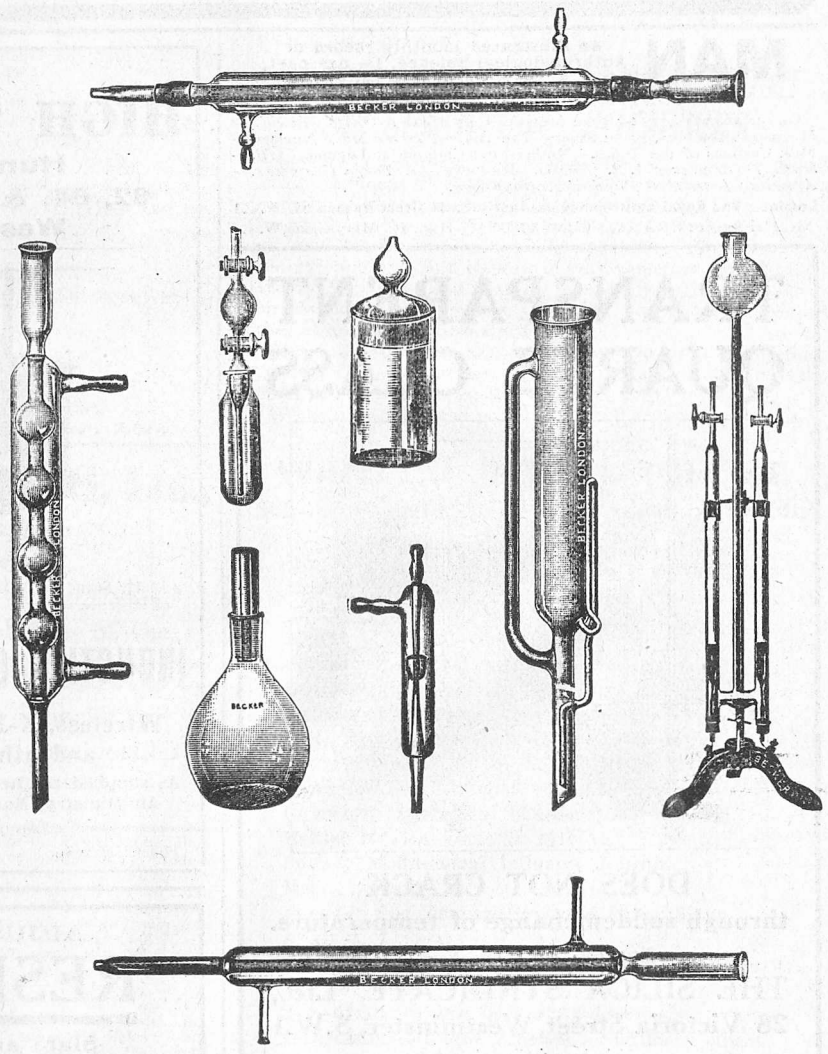

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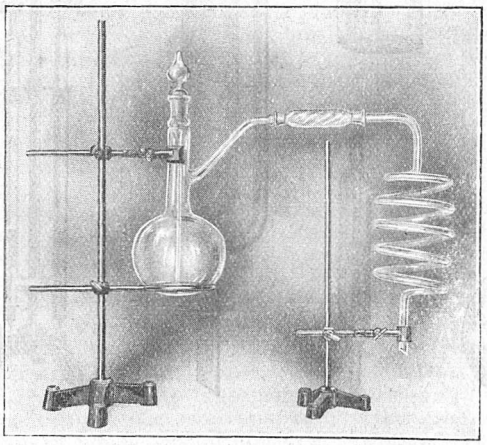

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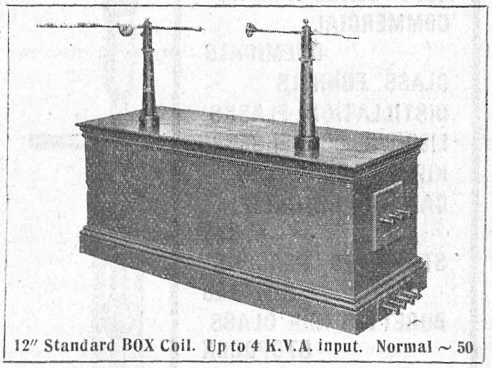

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XXVIII. Note on Æther and Motion. By Sir OLIVER LODGE.

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interesting observations on the nesting habits of the Kentish and little ringed plovers. The former species, he remarks, has a habit of embedding its eggs in the sand whenever they have to be left unguarded, no more than the broad end being exposed to view. During incubation they are brought to the surface again. The actual hatching time for the eggs of the little ringed plover—that is to say, the time taken from the "chipping" of the shell to the complete emergence of the chick—is not, apparently, less than forty-eight hours. The downy nestlings of these two species are readily distinguished by their markings, yet, when the chick of one species is substituted for that of the other, the parents do not seem to realise that such an exchange has been made.

PROPOSALS are on foot to develop and utilise the water-power resources of Iceland. In an article on the subject in *La Géographie* (vol. xxxii., No. 3) M. Rabot points out that the waterfalls of the island could provide at least 4,000,000 h.p. An Icelandic-Norwegian company proposes to harness the Thorsa, the longest river in Iceland, on which there are at least six splendid falls available for industrial purposes. The Thorsa could provide 800,000 h.p. for five months of the year, and not less than 1,100,000 h.p. for the rest of the year; the largest fall could furnish 500,000 h.p. for seven months. It is proposed to use this power in the manufacture of nitrates and sulphates of ammonia. A further project is attracting the attention of the Danish East Asiatic Co. It proposes to carry wheat from Port Nelson, on Hudson Bay, to Iceland, and there to utilise the power of the Thorsa River in milling it preparatory to export to Europe. Despite the abundance of water-power, Iceland presents certain disadvantages in its development as an industrial country. The frequency of earthquakes, not to mention eruptions of lava, may interfere with mechanical installations. Glacial floods, which are frequent and violent, may also cause difficulties. Lastly, the labour question will have to be solved, for Iceland has not sufficient labour to meet the demands of industrial development.

METEOROLOGICAL Office Circulars Nos. 31 and 32, to February 1, issued monthly, show that a climatological station has been established at Keswick, and observations will be used for the Monthly Weather Report from January. A climatological station has also been established at Strathpeffer, Ross-shire, so that, after a break of about eighteen months, this northern spa is again represented in the Monthly Weather Report. There is the gratifying information of a Rainfall Association for Munster. Much need for additional rain information for Ireland has been felt, especially with the prospect of forestry and water-power. There is promise of "the analysis of wind records at Southport"; this discussion by Mr. J. Baxendell uses twenty years' observations. Advance copies of a "Manual of Meteorology," part iv., are available for official use. It gives "The Relation of the Wind to the Distribution of Barometric Pressure," by Sir Napier Shaw. It is stated that "it represents the progress made chiefly by those who have been associated in the work of the Meteorological Office in the past twenty years." Circular No. 32 contains a scale of surface visibility as adopted by the Meteorological Office, the Admiralty Meteorological Service, Meteorological Service Royal Air Force, and the French Army Meteorological Service. The scale 0 to 8 is given in metres and in miles at which objects are not visible in good daylight, 0 not beyond 200 metres, and 8 not beyond 30,000 metres or 18·6 miles.

IN the *Revue générale des Sciences* for January 15, Prof. F. M. Jaeger, of the University of Groningen, gives a *résumé* of the results which have been obtained in his laboratory during the last five years on the chemico-physical properties of substances at high temperatures. The surface tensions of organic liquids have been determined up to about 200° C., and of fused salts up to 1600° C., by the submerged bubble method. While the surface tensions of organic liquids diminish rapidly with increase of temperature, those of fused salts change very little. The electrical conductivities of the fused salts have also been determined up to 1600° C. in some cases. All the salts investigated have conductivities which increase with temperature according to a linear law.

A SERIES of articles has appeared dealing with the radiation-characteristics of the incandescent mantle, being chiefly an extension of the work of Rubens on the thoria-ceria mixtures to a large family of such combinations. It exhibits the Welsbach mantle (Journal of the Franklin Institute, November, 1918) simply as one of a group of possible combinations of radiating materials. The closest study has been made of the behaviour under various conditions of the absorption bands to which the enhanced visible radiation of the more efficient mantles is due. No explanation has been found for the occurrence of the visible absorption bands of ceria and other materials, but the information obtained as to the conditions under which they appear and disappear has made possible a fairly complete explanation of the different behaviour of the mantle in flame and cathode-discharge heating.

IN two papers published in the Proceedings of the Tokyo Mathematico-Physical Society (ser. 2, vol. ix., October, 1918) Mr. Keiichi Aichi makes an interesting contribution to the hydrodynamical theory of density or temperature seiches. By developing Love and Rayleigh's treatment of oscillations in a fluid of variable density, he arrives at an expression for the period of internal seiches in a basin of uniform depth with vertical sides, in which two layers of uniform, but different, density are separated by a transition layer in which the density varies exponentially. Lakes of rectangular or circular shape alone are considered. The interest of such a discussion is mathematical rather than physical, as the theory takes no account of shelving shores or irregularity of shape. Therefore, for comparison of observed with computed periods it is as satisfactory to assume the simple case of a sharp discontinuity of density with uniform density above and below the boundary. Chrystal's treatment of the problem, as developed by Dr. E. M. Wedderburn, though less rigid mathematically, affords a safer method of comparison, as all the peculiarities of the shape of the lake basin are taken into account, and it is unnecessary to assume any arbitrary law for the variation of density. Taking the case of Loch Earn in August, 1911 and 1913, temperature seiches with periods of 15·2 hours and 19·5 hours respectively were observed. The corresponding periods computed by Dr. Wedderburn were 15·0 and 19·6 hours. Mr. Aichi, using the same data and employing his method of calculation, obtains periods of 17 and 16 hours. The papers conclude with some remarks on the possibility of internal seiches in the ocean, and it is shown that in a tropical sea, 3 km. deep and 1000 km. long, internal seiches with periods of from 3 to 4 days may be expected.

AN illustrated article in *Engineering* for January 31 gives particulars of the double-reduction geared turbines made by the Parsons Marine Steam Turbine Co., Wallsend-on-Tyne, for single-screw standard vessels. There is one high-pressure and one low-pressure tur-

bine working in series. The high-pressure turbine is of the impulse type, and coupled by means of flexible couplings and pinion to the starboard first reduction wheel. The low-pressure turbine is of the reaction type, and coupled in a similar manner to the port first reduction wheel. The first reduction wheels are mounted on pinion shafts working into the second reduction wheel, which is connected direct to the thrust shaft with a thrust block of the pivoted type. The total shaft horse-power of the installation is 2900; the speed of the propeller is 78 revolutions per minute, and each turbine has a speed of 3500 revolutions per minute. The gearing is arranged to give the following ratios:—From turbines to first reduction wheel, 7·9 to 1; from first reduction gearing to second reduction wheel, 5·7 to 1; and the total reduction ratio is 45 to 1. The wheels and pinions are of the usual double-helical type; the first reduction wheels are made of cast-iron with wrought-steel tyres shrunk on; the second reduction wheels are of cast-iron with cast-steel tyres shrunk on; all four pinions are of nickel steel. The axial pitches of the teeth in the first and second reduction gearing are 7/12 in. and 1 in. respectively; the angle of helix is 30°.

THE January, 1919, issue of the quarterly classified list of second-hand instruments for sale or hire published by Mr. C. Baker, 244 High Holborn, W.C.1, has been received. Several new pieces of apparatus, which Mr. Baker can still supply, are included in the list and are suitably distinguished. Readers who may require microscopes, surveying instruments, telescopes, spectroscopic apparatus, or physical apparatus of a general kind should examine this comprehensive catalogue.

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		R.A. h. m. s.	N. Decl. ° ′	Log r	Log Δ
March	2	7 9 33	63 56		
	6	7 17 51	63 17	0·26483	0·09827
	10	7 26 25	62 34		
	14	7 35 13	61 49	0·27717	0·13347
	18	7 44 7	61 1		
	22	7 53 3	60 10	0·28939	0·16706
	26	8 1 59	59 17		
	30	8 10 54	58 22	0·30146	0·19918
April	3	8 19 46	57 26		
	7	8 28 31	56 28	0·31333	0·22992
	11	8 37 11	55 28		
	15	8 45 42	54 28	0·32496	0·25932
	19	8 54 6	53 26		
	23	9 2 21	52 24	0·33635	0·28748
	27	9 10 29	51 21		
May	1	9 18 29	50 18	0·34748	0·31443
	5	9 26 22	49 14		
	9	9 34 4	48 10	0·35834	0·34020

Lick Observatory Bulletin No. 320 contains an elliptical orbit of comet 1918*d* (Schorr) calculated by Mr. H. M. Jeffers from observations on November 25 and December 3 and 7, 1918:—

$T = 1918$ Oct. 16·442 G.M.T.
$\omega = 285° 37′ 0″$
$\Omega = 118° 32′ 38″$ } 1918·0
$i = 5° 19′ 58″$
$\phi = 25° 35′ 14″$
$\log a = 0·512136$
$\mu = 605·066″$
Period = 5·8641 years

The time of perihelion is decidedly later, and the period shorter, than in the Copenhagen orbit.

"ANNUAIRE" OF THE BUREAU DES LONGITUDES.—This most useful little annual is so widely known that it is unnecessary to give an account of its main features. The essays vary from year to year; those in the present volume are: (1) The figures of relative equilibrium of a rotating homogeneous liquid, by P. Appell, and (2) The determination by interference of the diameters of heavenly bodies, by Maurice Hamy. (1) Treats the subject from an historical point of view, beginning with MacLaurin's ellipsoids of revolution, going on to those of Jacobi, with three unequal axes, then the tracing of the connection between these two classes and the investigation of the points of bifurcation; this leads on to the alternate direction of possible bifurcation, namely, the pear-shaped figures investigated by Liapounoff and Poincaré, many of which are illustrated in the text. Finally, the question of stability is dealt with, and the remarkable property of its interchange from one class of figures to another at the points of bifurcation. There is a very full bibliography. (2) Shows how the real diameters of such bodies as satellites and minor planets may be inferred from a study of their interference fringes. The following determinations (reduced to distance unity) are given as specimens:—Io, 4·90″; Europa, 4·35″; Ganymede, 6·40″; Callisto, 6·55″; and Vesta, 0·54″, or 250 miles. The author considers that with the Mount Wilson 100-in. reflector it might be possible to determine the angular diameters of 1st magnitude stars.

THE CHEMICAL DETECTION OF STRAIN IN IRON AND STEEL.

THE ninth volume of the Carnegie Scholarship Memoirs of the Iron and Steel Institute contains an account of an investigation on the above subject by Messrs. Whiteley and Hallimond, of the South Durham Steel and Iron Co. The research arose out of an observation made in the course of experiments in connection with the Eggertz test for combined carbon made by one of the authors. On examining the composition of the gases evolved when samples of steel were dissolved in dilute nitric acid, the authors noticed that the nitrous gases given off differed considerably in their proportions in the case of different samples. They were at first inclined to think that these variations were due to the influence of other elements, such as carbon and phosphorus, which are always present in steels. Later work, however, showed that the chief cause of the variations was the particular mechanical treatment to which the different samples have been subjected.

The paper is divided into two parts. In the first the authors discuss in some detail the chemical reactions involved, and the analyses of the gases formed when iron is dissolved in nitric acid. In the second they describe the changes in the reaction produced by mechanical work on various iron and steel samples, and show how the effect can be used to measure the progressive removal of cold work on annealing.

The reaction between nitric acid and various metals has been the subject of numerous investigations, among which may be mentioned those of Veley, Divers, Montemartini, and Stansbie. These researches deal mainly with copper, while iron has received much less attention. The authors point out that a variety of reduction products is obtained by the solution of metals in nitric acid. Nitrogen peroxide, nitric and nitrous oxides, nitrogen, ammonia, hydroxylamine, hydrogen, and hydrazine have all been obtained in pro-

portions which depend on the metal used and the temperature and concentration of the acid. The complete analysis of such a mixture is both difficult and tedious. In the case of iron, however, the last three of the gaseous products just mentioned have not been detected, and the chief products requiring estimation are nitrogen peroxide, nitric oxide, nitrogen, and ammonia.

The authors describe a method of collecting and analysing the gases yielded by a 0·30 gram sample dissolved at 100° C. Under these conditions they assume that the whole of the iron is ultimately converted into ferric nitrate. They discuss the primary and secondary reactions which they consider occur; and, in particular, the interchangeability of nitrogen and ammonia with nitric oxide and nitrogen peroxide is shown. They find that the reaction of pure iron undergoes an almost discontinuous change at a certain acid strength (about 24 grams per 100 c.c.), and that much of the nitrogen and ammonia is replaced by nitric oxide and nitric peroxide as the acid strength increases from 23 to 25. These are the two main groups of products, and they find that the ratio between the iron equivalents given by the two groups is approximately independent of the secondary reaction between the members of each group. By plotting as ordinate the weight of iron consumed in forming nitrogen and ammonia, and as abscissa the acid strength in grams per 100 c.c., a characteristic curve is obtained which they term "the reaction curve," and this expresses the principal feature of the reaction.

In the second part of their investigation the authors examined in several typical cases the relation between the reaction curve and the degree of strain in the sample, and found that the curves are always shifted to the right with increase in strain. Wires deformed by twisting yielded progressively advancing reaction curves, and measurable changes in the gas analyses were found to be produced by an amount of energy which, if developed as heat, would not raise the temperature of the material 1° C. Similar curves were obtained with drawn wires. The results are interpreted by the authors as indicating that cold working takes places in two stages: (1) The elastically stressed crystals are brought into an interlocked condition; and (2) the crystal structure is then progressively broken up with the production of amorphous material.

The method has been used by the authors to investigate the removal of cold work from iron by heat treatment, and in the case of the sample used it was found to be complete at 520° C. The results described are of considerable interest, and the method appears to be one of decided promise. H. C. H. C.

THE MINISTRY OF HEALTH BILL.

THE text of the Ministry of Health Bill, already noted as having been presented to the House of Commons on February 17, has since been published. As foreshadowed by Dr. Addison in his speech to the members of the Medical Parliamentary Committee, prior to its introduction, the Bill differs little from the measure originally presented to the last Parliament. That it does differ to some extent, however, particularly in bearing signs of having been worked at and polished, is worthy of mention. The new Bill carries the stamp of finality, and suggests that most of the State Departments performing health functions—the Local Government Board, the Board of Education, and the Insurance Commissioners especially—have arrived at arrangements more or less agreeable to all parties. The position as between the two first-named, for example, is shown to be fairly easy. Even as regards the place to be taken by the Insurance Commissioners, there is less reason for dissatisfaction, and concessions no doubt have been made by the various bodies and individuals concerned. Speaking generally, the measure is a hopeful one, and inspires the feeling that we are well on the way to the establishment of the Ministry. The tone adopted by Dr. Addison is significant of this also, as is the translation of Sir George Newman to the Local Government Board, and the granting to him of the title of "Chief Medical Officer," with the status of a Secretary of the Board.

One part of the Bill which has been carried over unaltered from its predecessor is that relating to the appointment of consultative committees, and Dr. Addison, by his utterances, has shown himself to be firmly wedded to this idea, and expectant of results of great value from the work to be done by these bodies. Doubtless he has every right to be hopeful. The Consumers' Council at the Ministry of Food, which may be regarded as more or less analogous, though it was occasionally sneered at, must have assisted the Food Controller considerably. There is no reason to suppose that the Ministry of Health consultative committees will be any less helpful. Indeed, since they are to consist of carefully selected experts on matters having a bearing on national health, they are almost bound to be more valuable. In any event, the consultative committee idea has this to recommend it: that it will popularise health work. The committees will serve as a most effective link between the Department doing the work and those for whose benefit the work is done. The Department and the workers will be less cloistered; the workers and those who are worked for will be more intimately associated. The public will see and hear of what is being done, and will come to recognise the necessity for assisting in, and taking advantage of, the efforts made. So far there have been remarkably few comments on the Bill, but on the whole the reception has been entirely favourable.

FORTHCOMING BOOKS OF SCIENCE.

AGRICULTURE AND HORTICULTURE.

A. and C. Black, Ltd.—Black's Gardening Dictionary, edited by E. T. Ellis. *Macmillan and Co., Ltd.*—Science and Fruit Growing: Being an Account of the Results obtained at the Woburn Experimental Fruit Farm since its Foundation in 1894, the Duke of Bedford and S. Pickering. *John Murray.*—Hints to Farm Pupils, E. W. Lloyd.

ANTHROPOLOGY AND ARCHÆOLOGY.

John Murray.—Travels in Egypt and Mesopotamia in Search of Antiquities, 1886–1913, Dr. E. A. Wallis Budge, 2 vols., illustrated.

BIOLOGY.

A. and C. Black, Ltd.—A new edition of Studies in Fossil Botany, Dr. D. H. Scott, illustrated. *Blackie and Son, Ltd.*—Life and its Maintenance: A Symposium on Biological Problems of the Day, Prof. W. M. Bayliss, Dr. F. G. Hopkins, E. Margaret Hume, Prof. A. R. Cushny, K. J. J. Mackenzie, Dr. E. J. Russell, R. G. Stapledon, A. S. Horne, Prof. S. J. Hickson, A. G. Tansley, Lt.-Col. M. Flack, R. C. Maclean, Prof. F. W. Oliver, Dr. H. M. Vernon, and Prof. H. Kenwood. *P. Blakiston's Son and Co. (Philadelphia).*—A Classbook of Economic Entomology, Prof. W. Lochhead; Outlines of Economic Zoology, Prof. A. M. Reese; The Elements of Animal Biology, Prof. S. J. Holmes. *The Cam-*

bridge University Press.—Fossil Plants, Prof. A. C. Seward, vol. iv. (Cambridge Biological Series). *Constable and Co., Ltd.*—Animal Life and Human Progress, edited by Prof. A. Dendy; Utility Ducks and Geese, J. W. Hurst, illustrated; Forests, Woods, and Trees in Relation to Hygiene, Prof. A. Henry, illustrated. *The Epworth Press.*—British Ferns and How to Identify Them, J. H. Crabtree, illustrated (The "How to Identify" Series). *Hutchinson and Co.*—Bird Behaviour," F. Finn, illustrated; Insect Artisans and their Work, E. Step, illustrated (Hutchinson's Nature Library). *J. B. Lippincott Co.*—The Chromosome Theory of Heredity, Prof. T. H. Morgan; Inbreeding and Outbreeding: Their Genetic and Sociological Significance, E. M. East and D. F. Jones; Pure Line Inheritance, H. S. Jennings; The Experimental Modification of the Process of Inheritance, Prof. R. Pearl; Localisation of Morphogenetic Substances in the Egg, Prof. E. G. Conklin; Tissue Culture, R. G. Harrison; Permeability and Electrical Conductivity of Living Tissue, Prof. W. J. V. Osterhout; The Equilibrium between Acids and Bases in Organism and Environment, Prof. L. J. Henderson; Chemical Bases of Growth, Prof. T. B. Robertson; Primitive Nervous System, G. H. Parker; Co-ordination in Locomotion, A. R. Moore (Monographs on Experimental Biology and General Physiology). *Longmans and Co.*—The Quantitative Method in Biology, Prof. J. MacLeod, and a new edition of British Birds, A. Thorburn, illustrated, vols. iii. and iv. *Macmillan and Co., Ltd.*—Botany of the Living Plant, Prof. F. O. Bower, illustrated; A Text-book of Embryology, vol. ii., The Non-mammalian Vertebrates, Prof. J. Graham Kerr, illustrated. *John Murray.*—A new edition of Heredity, Prof. J. Arthur Thomson, illustrated. *George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.*—Timbers and their Uses, with a series of fine illustrations of grains of wood from new photographs; Germination, A. E. Baines, illustrated. *Skeffington and Son, Ltd.*—Birds and the War, H. S. Gladstone, illustrated. *The University Tutorial Press, Ltd.*—Text-book of Botany (Indian edition), J. M. Lowson, revised by Birbal Sahni. *T. Fisher Unwin, Ltd.*—Firewoods: Their Production and Fuel Values, A. D. Webster, illustrated; and a new edition of Instincts of the Herd in Peace and War, W. Trotter.

Chemistry.

Baillière, Tindall, and Cox.—Fats, Waxes, and Essential Oils, W. H. Simmons; Coal-tar Dyes and Intermediates, E. de Barry Barnett; Explosives, including Matches and Pyrotechnics, E. de Barry Barnett; The Industrial Gases, Dr. H. C. Greenwood; Silica and the Silicates, J. A. Audley; The Rare Earths and Metals, Dr. E. K. Rideal; The Iron Industry, A. E. Pratt; The Steel Industry, A. E. Pratt; Gasworks Products, H. H. Gray; Animal Proteids, H. G. Bennett; Organic Medicinal Chemicals, M. Barrowcliff and F. H. Carr; The Petroleum Industry, D. A. Sutherland; Wood and Cellulose, R. W. Sindall and W. Bacon; The Carbohydrates, Dr. S. Rideal; Rubber, Resins, Paints, and Varnishes, Dr. S. Rideal (Industrial Chemistry Series). *Chapman and Hall, Ltd.*—Food: Its Composition and Preparation, M. T. Dowe and J. D. Jameson; Outlines of Theoretical Chemistry, Dr. F. H. Getman; Chlorination of Water, J. Race. *Constable and Co., Ltd.*—The Profession of Chemistry, R. B. Pilcher. *H. Holt and Co. (New York).*—College Text-book of Chemistry, Prof. W. A. Noyes. *Longmans and Co.*—Lead and its Compounds, Dr. J. A. Smythe; Liquid Fuel for Internal Combustion Engines, Sir Boverton Redwood, Bart., and Prof. J. S. S. Brame; Synthetic Colouring Matters: Sulphur Dyes, Prof. G. T. Morgan; Synthetic Colouring Matters: Vat Colours, Prof. J. F. Thorpe; Naphthalene, Prof. W. P. Wynne; Synthetic Colouring Matters: Azo-Dyes, Dr. F. W. Kay; Utilisation of Atmospheric Nitrogen: Synthetical Production of Ammonia and Nitric Acid, Prof. A. W. Crossley; Cement, B. Blount; The Principles and Practice of Gas Purification, E. V. Evans; Refractories, Dr. J. W. Mellor; Ozone and Hydrogen Peroxide: Their Properties, Technical Production, and Applications, Dr. H. V. A. Briscoe; Industrial Applications of the Rarer Metals, W. G. Wagner and W. E. F. Powney; Cellulose-Silk, C. F. Cross; The Electric Arc in Chemical Industry, Dr. J. N. Pring; Organic Synthetic Reactions: Their Application to Chemical Industry, Prof. J. B. Cohen; Synthetic Colouring Matters: Triphenylmethane Dyes, Prof. R. Robinson; Synthetic Colouring Matters: Anthracene and Allied Dyestuffs, F. W. Atack; Synthetic Colouring Matters: Acridine and Xanthene Dyestuffs, Dr. J. T. Hewitt; Synthetic Colouring Matters: Azine and Oxazine Dyestuffs, Dr. J. T. Hewitt; Synthetic Drugs: Local Anæsthetics, Dr. W. H. Hurtley and M. A. Whiteley; Plantation Rubber, G. S. White; Corrosion and Decay of Metals, Prof. C. H. Desch (Monographs on Industrial Chemistry); Boiler Chemistry, J. H. Paul; The Rare Earth Metals, Dr. J. F. Spencer; Chemical Affinity and Chemical Equilibrium, Dr. H. S. Taylor; and a new edition of Osmotic Pressure, Prof. A. Findlay (Monographs on Inorganic and Physical Chemistry); and a new edition of A System of Physical Chemistry, Prof. W. C. McC. Lewis, vol. iii., Quantum Theory (Text-books of Physical Chemistry). *The University Tutorial Press, Ltd.*—Senior Practical Chemistry, H. W. Bausor.

Engineering.

Constable and Co., Ltd.—Hot-bulb Oil Engines and Suitable Vessels, W. Pollock, illustrated; and new editions of Fuel, Water, and Gas Analysis for Steam Users, J. B. C. Kershaw; The Internal Combustion Engine: Being a Text-book on Gas, Oil, and Petrol Engines for the Use of Students and Engineers, H. E. Wimperis, illustrated; The Diesel Engine for Land and Marine Purposes, A. P. Chalkley, illustrated. *Longmans and Co.*—Aeroplane Structures, A. J. S. Pippard and Capt. L. Pritchard, with a preface by L. Bairstow, illustrated; Naval Architects' Data, J. Mitchell, edited by E. L. Attwood; Efficient Boiler Management, with Notes on the Firing of Coal-fired Reheating Furnaces, C. F. Wade; Ships' Boats: Their Qualities, Construction, Equipment, and Launching Appliances, E. W. Blocksidge.

Geography and Travel.

T. Fisher Unwin, Ltd.—In the Wilds of South America: Six Years of Exploration in Colombia, Venezuela, British Guiana, Peru, Bolivia, Argentina, Paraguay, and Brazil, Lieut. L. E. Miller, illustrated.

Geology and Mineralogy.

Chapman and Hall, Ltd.—Popular Oil Geology, V. Ziegler; Handbook of Mineralogy, Blowpipe Analysis, and Geometrical Crystallography, G. M. Butler. *H. Holt and Co. (New York).*—A new edition of Physiography, Advanced Course, Prof. R. D. Salisbury.

Mathematical and Physical Sciences.

George Allen and Unwin, Ltd.—Introduction to Mathematical Philosophy, Hon. B. Russell. *Blackie and Son, Ltd.*—Applied Optics, vol. ii., The Computation of Optical Systems, being the "Handbuch der

angewandten Optik" of Dr. A. Stenheil and Dr. E. Voit, translated and edited by J. Weir French. *The Cambridge University Press.*—Problems of Cosmogony and Stellar Dynamics, J. H. Jeans; Cambridge Astronomical Observations, vol. xxv. *Cassell and Co., Ltd.*—A new edition of Electricity in the Service of Man, Dr. R. M. Walmsley, vol. ii., section ii. *Chapman and Hall, Ltd.*—Analytic Geometry, M. M. Roberts and J. T. Colpitts; A Handbook of Physics Measurements, E. S. Ferry, O. W. Silvey, G. W. Sherman, jun., and D. C. Duncan, vol. i. Fundamental Measurements, Properties of Matter, and Optics, vol. ii. Vibratory Motion, Sound, Heat, Electricity, and Magnetism; Graphical and Mechanical Computation, Dr. J. Lipka; Mathematics for Engineers, W. N. Rose, part ii.; Graphic Dynamics, E. S. Andrews; and new editions of Descriptive Geometry, H. W. Miller, and Arithmetic for Engineers, C. B. Clapham. *Constable and Co., Ltd.*—A new edition of The Propagation of Electric Currents in Telephone and Telegraph Conductors, Prof. J. A. Fleming. *Longmans and Co.*—Applied Aerodynamics, L. Bairstow, illustrated. *Macmillan and Co., Ltd.*—Elementary Mensuration, Constructive Plane Geometry, and Numerical Trigonometry, P. Goyen, and a new edition of The Theory of Heat, T. Preston, revised by J. R. Cotter, illustrated. *The University Tutorial Press, Ltd.*—Intermediate Text-book of Magnetism and Electricity, R. W. Hutchinson; School Geometry (Matriculation Edition), A. G. Cracknell and W. P. Workman.

MEDICAL SCIENCE.

Baillière, Tindall, and Cox.—Injuries of the Head and Neck, Capt. L. Whale; The Heart: Past and Present, Dr. C. E. Lea; The Pituitary, Dr. W. Blair Bell. *John Bale, Sons, and Danielsson, Ltd.*—The Science and Art of Deep Breathing; Malaria and its Treatment in the Line and at the Base; Barbed Wire Disease; The Diseases of the New-born Child; The Essentials of Tropical Medicine; and new editions of The Surgical Treatment of Facial Neuralgia and The Prolongation of Life. *A. and C. Black, Ltd.*—Spas and Health Resorts of the British Isles: Their Mineral Waters, Climate, and the Treatment to be Obtained, Dr. T. D. Luke, illustrated; Cerebro-spinal Fever: The Etiology, Symptomatology, Diagnosis, and Treatment of Epidemic Cerebro-spinal Meningitis, Capt. C. Worster-Drought and Dr. A. M. Kennedy, illustrated; X-rays in General Practice: A Handbook for the General Practitioner and Student, Alice Vance Knox, with an introduction by Dr. R. Knox, illustrated (The Edinburgh Medical Series). *Cassell and Co., Ltd.*—The Story of English Public Health, Sir Malcolm Morris; The Housing Question, Dr. J. Robertson; The Welfare of the Infant and the Young Child, Prof. H. Scurfield; The Welfare of the School Child, Dr. H. J. Cates; The Welfare of the Expectant Mother, Dr. Mary Scharlieb; The Food Question, Dr. W. G. Savage (The Public Health Series); and a new edition of Elements of Surgical Diagnosis, Sir A. P. Gould and Dr. E. P. Gould, illustrated. *Constable and Co., Ltd.*—The Great War and the R.A.M.C., Lt.-Col. F. E. Brereton. *W. Heinemann (Medical Books), Ltd.*—Anaphylaxis and Antianaphylaxis, Dr. Bezredka, authorised English translation, edited and revised by Dr. S. R. Gloyne. *Longmans and Co.*—Tube Teeth and Porcelain Rods, J. Girdwood, illustrated. *Macmillan and Co., Ltd.*—Dr. John Fothergill and His Friends: Chapters in Eighteenth-century Life, Dr. R. H. Fox, illustrated. *Skeffington and Son, Ltd.*—Medical Research and Human Welfare: A Record of Personal Experiences and Observations during a Professional Life of Fifty-seven Years, Dr. W. W. Keen.

METALLURGY.

Constable and Co., Ltd.—A new edition of Malleable Cast Iron, S. J. Parsons.

METEOROLOGY.

Constable and Co., Ltd.—A new edition of Forecasting Weather, Sir Napier Shaw. *Methuen and Co., Ltd.*—Weather Study for Schools, E. Stenhouse.

PHILOSOPHY.

The Cambridge University Press.—Truth: An Essay in Moral Reconstruction, Sir C. Walston.

TECHNOLOGY.

Constable and Co., Ltd.—New editions of Glass Manufacture, Dr. W. Rosenhain; The Manufacture of Paper, R. W. Sindall; Wood Pulp, C. F. Cross, E. J. Bevan, and R. W. Sindall.

MISCELLANEOUS.

Constable and Co., Ltd.—Dictionary of Scientific Instruments, prepared by the British Optical Instrument Manufacturers' Association, illustrated; The Claims of Labour and of Capital, W. R. Cooper. *J. M. Dent and Sons, Ltd.*—New Town: A Proposal in Agricultural, Industrial, Educational, Civic, and Social Reconstruction, edited for the "New Town Council" by W. H. Hughes. *H. Holt and Co. (New York).*—The World's Food Resources, Prof. J. Russell Smith. *Macmillan and Co., Ltd.*—Annals of the Philosophical Club of the Royal Society, written from its Minute Books, Prof. T. G. Bonney. *Methuen and Co., Ltd.*—A Text-book of Hygiene for Training Colleges, M. Avery; School and Fireside Crafts, A. Macbeth, illustrated. *John Murray.*—Education, Secondary and University, Sir F. G. Kenyon. *George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.*—Routledge's Industrial Supremacy Books, dealing with agricultural machinery, commercial instruments, forestry, optical instruments, prepared foodstuffs, reproduction and utilisation of sound, shipbuilding, jig and tool making, testing machines, and watch and clock making; Handicrafts for the Handicapped, Dr. H. J. Buck and M. M. C. Buck, illustrated; The Science of Labour and its Organisation, Dr. J. Ioteyko; The Human Motor and the Scientific Foundations of Labour, Dr. J. Amar, with a preface by Prof. H. Le Chatelier, translated by E. Butterworth, the translation revised and edited by A. R. J. Ramsey, illustrated. *T. Fisher Unwin, Ltd.*—The Training of Youth: A Treatise on the Training of Adolescents, T. W. Berry.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Drapers' Company has resolved to continue its grant of 1000*l.* per annum towards the salaries of the professor of agriculture and the professor of agricultural botany for a period of ten years.

Mr. N. K. Adam, fellow of Trinity College, has been appointed to the Benn W. Levy research studentship in biochemistry for one year.

The Senate has approved a grace providing for the establishment of the degree of doctor of philosophy. The syndicate dealing with this question recommends that, subject to certain exemptions, candidates for the degree, before submitting a dissertation, must have pursued a course of research for not less than three years, and the Senate has determined that of this

period one year in the case of a graduate of the University and two years in the case of other students must be spent in Cambridge.

The Adams prize, value 250*l.*, has been awarded to Prof. J. W. Nicholson, professor of mathematics at King's College, University of London.

Mr. Emile Mond has offered to give 20,000*l.* for the establishment of a Francis Mond professorship of aeronautical engineering in memory of Lieut. Mond, who was killed in action last year. The council of the Senate recommends that the offer be accepted with grateful thanks.

EDINBURGH.—Mr. Robert Kerr Hannay has been appointed professor of ancient history and palæography (Sir William Fraser chair) in succession to the late Prof. P. Hume Brown.

Dr. George Barger has been appointed to the new chair of chemistry in connection with medicine. Dr. Barger is at present research chemist to the Medical Research Committee, National Health Insurance. Previous to 1914 he was professor of chemistry in the Royal Holloway College, University of London.

The University Court has resolved, on the recommendation of the professor of natural history, to establish a chair to deal specially with the zoology of the invertebrates.

LIVERPOOL.—Two years ago Prof. and Mrs. Herdman gave to the University the sum of 10,000*l.* to establish a chair of geology in memory of their son, Lieut. George A. Herdman, who was killed in action. They have now made a further gift of 10,000*l.* for the purpose of establishing a chair of oceanography to embrace and continue the work of the fisheries laboratory at the University, the Port Erin Biological Station, and the scientific investigations of the Isle of Man Fishery Board and the Lancashire and Western Sea Fisheries Committee. The council of the University has accepted this generous benefaction with grateful thanks, and has resolved that (1) Prof. Herdman be appointed professor of oceanography as from October 1 next; (2) Dr. J. Johnstone succeed him on October 1, 1920, and during the twelve months from October 1 next be lecturer on oceanography at the salary derived from the endowment. The establishment of this chair is of particular scientific interest, not only because this is the first chair in the subject in the British Isles, but also because the donors intend it to be, in the main, a research chair, with applications to sea fisheries. The place and time are both most appropriate for work in these directions; and the University is fortunate in its association with Prof. Herdman, whose investigations for our fisheries during many years have been of high distinction, and whose generosity now enables them to be carried to further development for the advancement of science and the benefit of the nation.

MR. T. J. DRAKELEY, of the Wigan Mining and Technical College, has been appointed lecturer in chemistry at the Northern Polytechnic Institute, Holloway.

THE sum of 800*l.* has been given to the South-Eastern Agricultural College, Wye, by Mr. Figgis for the endowment of a scholarship in memory of his son, a former student of the college, who was killed in the war. Mr. A. H. Chaytor, of the University of Cambridge, has provided money for the equipment of a bacteriological laboratory at the college.

As the result of the appeal made in October last to friends of the late Mr. F. W. Rudler, a sum of 100*l.* was received, which has been invested in War stock and inscribed in the name of the University College of Wales, Aberystwyth. The annual income from this sum will be applied towards defraying the expenses incurred by deserving students of the Geological Department of the college on their "field excursions." This opportunity is taken of thanking the donors for their valued contributions.

SPEAKING at Oxford on Saturday last on "The Place of the University in National Life," Mr. H. A. L. Fisher, President of the Board of Education, said that the war has brought into clearer relief the fact that the universities and technical colleges have stood for a great deal in the national equipment during these times of stress and strain. No fewer than thirty university laboratories were made use of in 1918 in a single department of warfare. The fact that the State has become conscious of the value of the university as an integral constituent of national power acquires more and more significance. New legislation will affect the universities in three ways. It will fit a great number of men and women for university life, and so increase the number of candidates for the bachelor's degree. It will certainly create a greatly increased demand for teachers in State-aided schools. Lastly, it will create a new *clientèle* for extra-mural university teaching.

THE annual distribution of prizes and certificates to the students of the Sir John Cass Technical Institute, Aldgate, took place on February 18, when the awards were distributed by Dr. C. C. Carpenter, chairman of the South Metropolitan Gas Co. Sir Thomas Elliott, Bart., chairman of the governing body, presided. The Rev. J. F. Marr, chairman of the institute committee, in the course of an account of the work of the past session, stated that 242 students and 17 members of the staff had served with H.M. Forces during the war, of whom 15 had given their lives in the service of their country. In addressing the students, Dr. Carpenter said that institutions such as the Sir John Cass Technical Institute appealed to him very strongly, primarily because they allowed the ordinary vocations of life to be carried on during the ordinary working hours, while the evenings were devoted to the extension of knowledge, so that practical experience and responsibility were associated with a full training in the principles of the sciences which formed the basis of industrial experience and progress. He remembered, as a young man, being confronted with problems at the works which he was unable to see through, but he also had a vivid recollection of the sudden rays of light which were thrown upon that work after having had an opportunity, through a similar institution, of studying the science underlying the whole subject. He went on to point out the importance of lucid expression, the putting down of results in clear and concise language. He also urged students not to ignore the great value of an elementary training in freehand drawing in order to be able to make, in the same way that one would make a note of a process or a reaction, a note of the apparatus concerned. Dr. Carpenter complained of the inertia of English manufacturers as compared with German, in many instances it having been necessary to go to Germany when English manufacturers said certain requirements were impossible. That was one respect in which a great change must come over industry in Great Britain. The war had opened the eyes of manufacturers to the possibilities of what could be achieved by skilled and scientific management.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 13.—Sir J. J. Thomson, president, in the chair.—L. **Bairstow** and A. **Berry**: Two-dimensional solutions of Poisson's and Laplace's equations. Starting from a theorem stated in Lamb's "Hydrodynamics," problems involving solutions of Poisson's equation are interpreted in terms of the motion of the conventional inviscid fluid of hydrodynamics. The theorem states that the continuous acyclic motion of such a fluid inside or outside a rigid boundary can be reproduced by a system of sources round the boundary in all cases for which the fluid is at rest at infinity. The special point of the present paper is the formation and solution of an integral equation in order to find the strength of the sources. The answer appears as a series of integrals which is convergent in the four illustrations given; proof of convergency in the full mathematical sense is not attempted. The method of solution is applicable to boundaries of any shape and to more than one boundary. The integrals are easily obtained by graphical and mechanical methods.—Dr. G. H. **Thomson**: The cause of hierarchical order among the correlation coefficients of a number of variates taken in pairs. From the tendency towards "hierarchical" order among correlation coefficients in mental tests, the conclusion has in the past been drawn that all these correlations are due to the presence of a general factor, and that none of them are due to group-factors which run through two or more tests, but not through all. Although *perfect* hierarchical order can only be produced in this way, an approximation to perfection can be attained without any general factor by leaving the number and identity of the group and specific factors in each variate to chance. A card experiment is described in which this is done, and specimens of the resulting hierarchies are given. The proof depends on the formulæ of Pearson and Filon for the correlation of errors of correlation.—Dr. G. N. **Watson**: The transmission of electric waves round the earth. From Austin's experimental results it appears that the magnetic force due to a Hertzian oscillator varies as $\operatorname{cosec}\frac{1}{2}\theta \exp.(-A\lambda^{-\frac{1}{2}}\theta)$ at angular distance θ from the oscillator, where λ is the wave-length and, in the case of signals over the sea, the constant A has the value 9·6. It seems impossible to obtain any formula resembling this from a theory of pure diffraction, and it is therefore necessary to examine the hypothesis (put forward by Heaviside and others, and submitted to some analytical treatment by Eccles) that the upper regions of the atmosphere act as a reflector of the waves. It is found that a formula of Austin's type is a consequence of this hypothesis, and that the numerical value of A given by Austin is obtained by assigning suitable values to the conductivity of the reflecting layer and its height above the surface of the earth. The problem of waves over dry land is also considered and the appropriate value of A determined.

Geological Society, February 5.—Mr. G. W. Lamplugh, president, in the chair.—Dr. A. Logie **Du Toit**: The geology of the Marble Delta (Natal). The paper deals with the crystalline dolomitic marbles of Port Shepstone (Natal), rocks that have already been the subject of several communications to the society; but its main object is to demonstrate that certain "boulders" of alkali-granite, formerly regarded as inclusions, are in reality parts of intrusive tongues, and to discuss the mutual relations of the igneous rocks and the adjacent dolomites.

Linnean Society, February 6.—Sir David Prain, president, in the chair.—N. E. **Brown**: (1) A new species of Lobostemon in the Linnean herbarium; (2) Old and new species of Mesembryanthemum, with critical remarks. (1) Mr. C. C. Lacaita, in 1917, being engaged on a critical revision of Echium, directed the author's attention to a sheet written up by Linné as *Echium argenteum*, which upon examination could not be identified with any specimen at Kew or the British Museum, or even in herbaria at the Cape. It is entirely different from *Lobostemon argenteus*, Buek, syn. *Echium argenteum*, Bergius, with which Linné supposed it to be identical. This single specimen, collected at least 147 years ago, does not appear to have been found by any other collectors since that date. The locality given, "montibus nigris," by Linné, is Zwartberg, as confirmed by Governor Tulbagh's list (Proc. L.S., 1917–18, Suppl., p. 10), where it is No. 145—these figures appearing on the sheet itself, and in the list written up as *Echium fruticosum*, a name abandoned before publication. (2) This paper gave the history of the genus Mesembryanthemum from the time of Adrian H. Haworth, between 1794 and 1821, who published four monographs of the genus, described mostly from living plants, cultivated by himself or at Kew. His short descriptions are insufficient for identification, but happily a large number of his species are represented by a series of coloured drawings by George Bond and Thomas Duncanson, two artists employed at Kew between 1822 and 1835 to make drawings of the plants cultivated there. The result is that many hundreds of excellent drawings are in existence at Kew, but unpublished and practically unknown, and the attention of botanists is directed to them, about one-fourth of them being of species of Mesembryanthemum.

Optical Society, February 13.—Prof. F. J. Cheshire, president, in the chair.—Lord **Rayleigh**: The possible disturbance of a range-finder by atmospheric refraction due to the motion of the ship which carries it. It was stated that the suggestion had been put forward that the action of a range-finder adjusted for a quiescent atmosphere may be liable to disturbance when employed upon a ship in motion, as a result of the variable densities in the air due to such motion and the consequent refraction of the light. The question arises as to the direction and magnitude of the effect, and whether or not it would be negligible in practice. This question was treated mathematically in the paper.—L. C. **Martin** and Mrs. C. H. **Griffiths**: Deposits on glass surfaces in instruments. The first section of the paper contained a summary of the various phenomena that have been described under the name of "film." In instruments deposits occur most frequently on the graticules, and a discussion is given as to the probable action of the lubricants in bringing about the formation of the deposit. The qualities desirable in a lubricant to be used on optical instruments are also enumerated, and a brief summary is made of the results of hitherto published information on the subject of the deposits. The second section gives a short classification of the deposits according to their microscopic appearance, and describes a series of experiments made to test the cause of the formation of the deposit. The experiments were conducted by means of brass cells into which graticule blanks were fitted as windows, these glass surfaces being examined microscopically during the course of the experiments.

Royal Meteorological Society, February 19.—Sir Napier Shaw, president, in the chair.—Dr. S. **Chapman**: The lunar tide in the earth's atmosphere. The lunar tidal variation of barometric pressure has been well determined at Batavia, from fifty years' hourly record, and from shorter series of data, extending over about five years in each case at St.

Helena, Singapore, Rome, and Samoa. As very little was known about its dependence on latitude, season, and the distance, declination, and phase of the moon, a new and detailed discussion has been made of thirty and twenty-eight years' records of barometric pressure at Batavia and Hong Kong respectively. The results are described in this paper, and considered alongside the pre-existing values from the stations above-named, together with the Greenwich determination recently published in the Quarterly Journal of the society. It appears that the amplitude varies approximately as the fourth power of the cosine of the latitude, while the phase varies somewhat irregularly from 33° (Samoa) to 114° (Greenwich), where 90° corresponds with the occurrence of maximum pressure when the moon is on the meridian. No dependence on lunar phase or declination was detected, while as regards the moon's distance, an increase of amplitude from apogee to perigee was observable, though less than the increase in the tide-producing force. Distinct evidence of a seasonal variation of amplitude and phase was shown by both the Hong Kong and Batavia determinations. The conclusion drawn from the various results is that the lunar atmospheric tide is not a simple tidal phenomenon, but is complicated by other effects, notably by resonance with an adjacent free period of vibration of the atmosphere, and possibly also by more local causes, such as the rise and fall of the ocean.—M. **Christy**: The gunfire on the Continent during 1918: its audibility at Chignal St. James, near Chelmsford. Observations on the audibility of the Continental gunfire have been made by the author for four years. The results for previous years were brought forward in earlier papers. In 1918 the first sounds were heard on the evening of May 8 and the last on August 26, thus confirming previous experience that there is audibility at the writer's post of observation in Essex only during the summer months. The period of audibility in 1918 amounted to 15 weeks, 5 days. In previous years the periods were: 1915, 17 weeks, 3 days; 1916, 15 weeks; 1917, 19 weeks, 4 days. The average for the four years is 17 weeks. A feature of 1918 was that the sounds were less loud and distinct than in previous years, and there were none of the periods of extreme loudness which had been noticed before.

SHEFFIELD.

Society of Glass Technology, February 19.—Mr. J. Connolly in the chair.—J. D. **Cauwood**, Constance **Muirhead**, and W. E. S. **Turner**: The properties of the lime-soda glasses: (2) The resistance to water and other reagents. Several glasses had been melted on a small scale, and the lime content increased by definite amounts. The resistance of each glass to the following reagents—water, caustic soda solution, sodium carbonate solution, hydrochloric acid—had been tested. In every case it was found that increasing the lime content brought about increasing resistance.—S. **English** and W. E. S. **Turner**: The properties of the lime-soda glasses: (3) The thermal expansions. The same series of glasses mentioned above (*i.e.* lime contents increasing to 10 per cent.) had been tested in regard to thermal expansion. It had been proved that the expansion decreased as the lime content increased. Both papers proved the value of lime as a constituent of ordinary glasses.—Prof. P. H. **Boswell**: Impressions of the glass industry of the United States gathered on a recent visit. The author dealt first with the supplies of raw materials as found in the States. Six sands were in general use; one of them, a beautiful sand from Rockwood, Detroit, was used exclusively for optical glass. The American "sands" are not found as such, but in the form of sandstone (fairly soft). This is blasted, washed by water, under pressure, into the bottom of the pit, whence it is dredged up to the top of the pit. It is emptied into concrete bins, and works down through steam pipes until it emerges as dry, clean-running sand. Prof. Boswell afterwards dealt briefly with American supplies of potash and felspar, and then passed on to the question of refractories. He showed a specimen of a glasshouse pot which had been developed by Dr. Bleininger, and this pot, after the melt had been performed, was perfectly white in colour and very close in texture. In making their pots the Americans were substituting Cornish kaolin by kaolin from Georgia, and using ball clays from Tennessee and Kentucky in place of those from Devon and Cornwall.

PARIS.

Academy of Sciences, February 10.—M. Léon Guignard in the chair.—The president announced the death of Jean Jacques Théophile Schlœsing, member of the section of rural economy and the oldest member of the Academy.—A. **Lacroix**: Dacites and dacitoïdes, with reference to the lavas of Martinique. The name dacitoïde is proposed for a class of mineral hitherto classified as andesites and allied to dacites. Twelve complete analyses of Martinique minerals are given and discussed from the point of view of this new classification.—J. **Bergonié**: The reconstitution of isolated muscles or of muscular groups by intensive rhythmic faradisation. The method has special reference to the treatment of wounded men; it causes no nervous fatigue, and for the greater part of the time of application is not felt. The improvement in many directions is marked.—M. Jean Effront was elected a correspondant for the section of rural economy in succession to M. Leclainche, elected member of the section.—L. **Roy**: The dynamical resistance of steel.—A. **Sanfourche**: The oxidation of nitric oxide by dry air. The rate of oxidation of nitric oxide was studied over a range of temperatures from −50° C. to 450° C. The first stage of oxidation, to nitrous anhydride, is very rapid, and is unaffected by temperature. The oxidation of nitrous anhydride to nitrogen peroxide is a reversible reaction, takes an appreciable time, and the rate is dependent on the temperature if above 200° C.—L. **Joleaud**: The migrations at the neogene epoch of Hipparion, Hippotraginæ, and Tragelaphinæ.—M. **Rouch**: The land and sea breezes at Bayonne.—M. **Mirande**: The microchemical reactions and localisations of the alkaloid of *Isopyrum thalictroides*.—J. **Pantel**: The *rôle* of calcium in the mineralisation of the nucleus of the excreting cells in the Phasmides.—R. **Fosse**: The formation, by oxidation of organic substances, of an intermediate term spontaneously producing urea. Proteins and amino-acids, oxidised by potassium permanganate by Béchamp's method, give appreciable proportions of urea, and the amounts are increased if ammonia is present. The urea formed is separated and estimated by the xanthydrol method previously described by the author.—Em. **Bourquelot** and M. **Bridel**: The biochemical synthesis, with the aid of emulsin, of the β-glucoside of α-naphthyl alcohol.—E. **Debains** and E. **Nicolas**: The causes of death in horses immunised with dead bacteria or bacterial extracts.

MELBOURNE.

Royal Society of Victoria, November 7, 1918.—Mr. J. A. Kershaw, president, in the chair.—R. T. **Patton**: Notes on fossil Eucalypt leaves from the Tertiary at Bulla.—Dr. E. F. J. **Love**: The real significance of the

Michelson-Morley experiment.—Prof. A. J. **Ewart**: (1) Contributions to the flora of Australia. No. 27. (2) The synthesis of sugars from formaldehyde. A detailed account was given of the polymerising action of various alkalis on formaldehyde, and also of the influence of temperature, dilution, etc. In the presence of a calcium salt the polymerising action of sodium hydrate is greatly increased, and evidence is brought forward to show that the polymerising action is analogous to that of a condensing enzyme.

December 12, 1918.—Mr. J. A. Kershaw, president, in the chair.—F. **Chapman**: New or little-known fossils in the National Museum. Part xxiii.: Some Hydroid remains of Lower Palæozoic age from Monegetta, near Lancefield. These are well-preserved specimens, and are referred to the order Calyptoblastea. Two new genera and four new species are described. The genera represented are Mastigograptus, Ruedemann, Archæolafoëa, gen. nov., and Archæocryptolaria, gen. nov. Gonothecæ appear to be present in three of the forms. The horizon is the lowest in the Ordovician.—R. T. **Patton**: The structure, growth, and treatment of some common hardwoods. Attention was directed to the core-wood of some hardwoods which are soft and sappy, such as is shown by timber grown in excessive shade, the result of overcrowding whilst young. The author showed that there was no advantage in stacking timber on end, and gave the rates of drying of timber cut in various ways. The electrical resistance of a piece of timber determined whether it was properly seasoned. Estimates of the growth and timber yield of mountain ash and Messmate were explained in the form of curves, from which the forest yield at various ages could be predicted.—J. T. **Jutson**: The sand-ridges, sand-plains, and sand-glaciers at Comet Vale, in sub-arid Western Australia. The physical features of Comet Vale, sixty miles north of Kalgoorlie, include a portion of a "dry lake" (Lake Goongarrie), and a belt of rocky "high" lands on its western shore composed of ferruginous laterite and "greenstones," and dissected by narrow valleys. North, north-west, and east are extensive sand-plains with ridges trending east and west. Immediately to the west of the "high" lands a sand-plain slopes gently to the west. The sand drifts eastward through some "passes" in a laterite ridge (the western end of the "high" land area) and spreads out as "sand-glaciers," according to the term used by Free. The sand forming the smooth sand-plain and glaciers is wind-borne. This will probably explain the origin of extensive sand-plains elsewhere in Western Australia. The eastward march of the sands has blotted out the drainage lines to the west of the "high" lands.—Dr. C. **Mackenzie** and W. J. **Owen**: Note on the parathymus gland in the marsupial. Three glands new to science in the Platypus have lately been described by the authors. One of these, the parathymus, has since been described by them in the Tasmanian Devil, in which it is larger than in the Platypus.—N. C. B. **Allen** and Prof. T. H. **Laby**: The sensitivity of photographic plates to X-rays.

SYDNEY.

Linnean Society of New South Wales, September 25, 1918.—Prof. H. G. Chapman, president, in the chair.—Prof. W. N. **Benson**: The geology and petrology of the Great Serpentine Belt of New South Wales. Part viii.: The extension of the Great Serpentine Belt from the Nundle district to the coast.—G. I. **Playfair**: New and rare fresh-water Algæ. Sixty-six new forms are described and figured, twenty-eight being admitted to specific rank, twenty-nine classed as variations, and nine as forms; one genus is proposed as new.—Dr. J. **Shirley** and C. A. **Lambert**: The stems of climbing plants. Abnormal stem-structures in climbing plants have for their object the free flow of elaborated sap in the bast-tissues. Seven classes of Dicotyledons and two of Monocotyledons are proposed, based on the arrangement of the tissues concerned.—Dr. V. F. **Brotherus** and the Rev. W. W. **Watts**: The mosses of North Queensland. Being essentially Malaysian, rather than Australian, in their affinities, the number of new species was smaller than was anticipated. Seventeen genera new to Australia are listed, and some thirty known species. One genus and fourteen species are described as new.—Dr. R. J. **Tillyard**: Mesozoic insects of Queensland. Part iv. Hemiptera Heteroptera: the family Dunstaniidæ. With a note on the origin of the Heteroptera. Originally described in 1916 as a Lepidopteron by the author, the fossil *Dunstania pulchra* has created considerable interest and discussion. This paper, first of all, gives an account of the various suggestions that have been put forward as to its true affinity, and shows that opinions have favoured its relationship with no fewer than four orders (Lepidoptera, Homoptera, Diptera, and Plectoptera). Having definitely rejected all these, the author only found the true solution from the study of more recently discovered material from the same Upper Triassic beds at Ipswich, Queensland. These prove that the family Dunstaniidæ belongs to the Hemiptera Heteroptera. The new material is described and placed in two new genera, Dunstaniopsis and Paradunstania, each containing a single new species. The venation is worked out by comparison with the nymphal tracheation of a recent Heteropteron (Syromastes sp.). Finally, in considering the origin of the Heteroptera, the author shows that the Dunstaniidæ are closely related to the Permian fossil Prosbole, placed by Handlirsch in a separate order, Palæohemiptera. This order is considered to be only a sub-order within the Hemiptera; and the Dunstaniidæ, which are true Heteroptera, are derived from the immediate ancestors of Prosbole, not from Prosbole itself.

Royal Society of New South Wales, December 4, 1918.—Mr. W. S. Dun, president, in the chair.—Marguerite **Henry**: Some Australian Cladocera. The fresh-water Crustacea dealt with in this paper were collected at Kendall, Cumbalum, Casino, and Byron Bay on the north coast; in the neighbourhood of Sydney; and at the Lett River, Blue Mountains, Port Stephens, Bathurst, Mudgee, and Corowa. Twenty-six species were found, of which nine are described as new.—J. H. **Maiden**: Notes on Eucalyptus (with descriptions of two new species in co-operation with Mr. R. H. Cambage). No. vi. One of the two new species described is a Box from just south of the Gulf of Carpentaria, the other a Stringybark from the Blue Mountains, long confused with *E. capitellata* originally described from Port Jackson. The Flooded Gum of the coastal districts is proposed to be raised to the rank of a species, following an almost forgotten suggestion of Mr. Walter Hill, of Brisbane, made many years ago. It is suggested that Müller's abandoned name for the morrel-tree of Western Australia should be revived, and a remarkable variety of *E. pyriformis* is described from the interior of that State. The paper contains a number of critical notes in regard to the distribution and morphology of Australian gum-trees.—Dr. T. H. **Johnston** and Miss M. **Bancroft**: Some new sporozoon parasites of Queensland fresh-water fish. On various occasions there have broken out in western Queensland serious epidemics amongst the fresh-water fish, resulting in their wholesale destruction, and, as a result, pollution of the water supply has taken place. The authors have investigated the outbreak in order to determine its cause. They have been engaged in field work, and in the course of their inquiry came across a number of minute protozoon parasites of

fishes. These tiny parasites form cysts in various organs of the body, particularly in the gills. They do not seem to have any marked detrimental effect on their hosts. The parasites are distributed amongst five distinct genera, all belonging to the Sporozoa. Of these five genera only one had been previously recorded from Australia.—H. G. **Smith**: The occurrence of the terpene terpinene in the oil of *Eucalyptus megacarpa*. This somewhat rare terpene has not previously been detected in eucalyptus oils. The oil of this species consists principally of terpenes with about 30 per cent. of cineol (eucalyptol) and a small quantity of the esters geranylacetate and butylbutyrate. The characteristic terpinenenitrosite, m.p. 155° C., was prepared without difficulty. It is interesting that terpinene should occur in a species belonging to the earlier portion of the genus Eucalyptus and in Western Australia, while the corresponding terpene phellandrene is found in the oils of the more recent species growing in the south-eastern portion of the continent.

BOOKS RECEIVED.

The Drift to Revolution. (Papers for the Present. Third series. No. 9.) Pp. 52+iv. (London: Headley Bros., Ltd., 1919.) 1*s*.

The Strawberry in North America: History, Origin, Botany, and Breeding. By Prof. S. W. Fletcher. Pp. xiv+234. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1917.) 8*s*. net.

Le Nubi. By Luigi Taffara. Parte prima. Pp. 67. Parte ii., Atlante (plates). Tav. xxvi. (Roma: Tipografia Ditto L. Cecchini, 1917.)

Joys of the Open Air. By William Graveson. Pp. 115. (London: Headley Bros., Ltd., n.d.) 3*s*. 6*d*. net.

America at School and at Work. By Rev. Dr. H. B. Gray. Pp. xx+172. (London: Nisbet and Co., Ltd., 1918.) 5*s*. net.

The Spiritual Foundations of Reconstruction: A Plea for New Educational Methods. By Dr. F. H. Hayward and Arnold Freeman. Pp. lxi+223. (London: P. S. King and Son, Ltd., 1919.) 10*s*. 6*d*. net.

Dynamics. Part ii. By R. C. Fawdry. (Bell's Mathematical Series.) Pp. viii+179–355+vii. (London: G. Bell and Sons, Ltd., 1919.) 2*s*. 6*d*.

The A B C of Aviation. By Capt. V. W. Pagé. Pp. xii+13–274+7 plates. (New York: The Norman W. Henley Publishing Co.; London: Crosby Lockwood and Son, 1918.) 12*s*. 6*d*.

Standard Tables and Equations in Radio-telegraphy. By Bertram Hoyle. Pp. xiv+159. (London: The Wireless Press, Ltd., 1919.) 9*s*. net.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 27.

ROYAL INSTITUTION, at 3.—Prof. H. M. Lefroy: How Silk is Grown and Made.

ROYAL SOCIETY, at 4.30.—Hon. R. J. Strutt: Scattering of Light by Sold Substances.—Sir James Dobbie and Dr. J. J. Fox: The Constitution of Sulphur Vapour.—Dr. W. G. Duffield, T. H. Burnham, and A. H. Davis: The Pressure upon the Poles of the Electric Arc.

CHILD-STUDY SOCIETY, at 6.—Dr. P. B. Ballard: The Claim of the Individual Child.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Dr. S. F. Barclay and Dr. S. P. Smith: The Determination of the Efficiency of the Turbo-alternator.

FRIDAY, FEBRUARY 28.

PHYSICAL SOCIETY, at 5.—Philip R. Coursey: Simplified Inductance Calculations, with Special Reference to Thick Coils.—Dr. Ralph Dunstan: Demonstration of Some Acoustic Experiments in Connection with Whistles and Flutes.—G. A. Brodsky: Demonstration of a New Polariser.

ROYAL INSTITUTION, at 5.30.—Sir Oliver Lodge: Ether and Matter.

SATURDAY, MARCH 1.

ROYAL INSTITUTION, at 3.—Hon. J. W. Fortescue: The Empire's Share in England's Wars—Eastern Europe.

MONDAY, MARCH 3.

VICTORIA INSTITUTE, at 4.30.—M. J. Rendall: The Vocation of a Teacher.

ARISTOTELIAN SOCIETY, at 8.—Mrs. N. A. Duddington: Our Knowledge of Other Minds.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—*Adjourned Discussion*: A. R. Ling: Refractometry and its Applications in Technical Analysis.—*Papers*: F. Esling: Notes on the Setting Time of Portland Cement.—Dr. G. H. J. Colman and E. W. Yeoman: The Determination of Benzol, Toluene, etc., in Coal Tar and similar Products.—Dr. P. E. Spielmann and F. Butler Jones: Estimation of Carbon Disulphide. A Critical Examination of the Various Methods usually employed.

TUESDAY, MARCH 4.

ROYAL INSTITUTION, at 3.—Prof. H. Maxwell Lefroy: How Silk is Grown and Made—Mulberry Silk.

ROYAL SOCIETY OF ARTS, at 4.30.—Prof. J. C. McLennan: Science and Industry in Canada.

ZOOLOGICAL SOCIETY, at 5.30.—Dr. J. A. Murray: Report on the Deaths in the Gardens during the Year 1918.—G. A. Boulenger: A Collection of Fishes from Lake Tanganyika, with Descriptions of Three New Species.—Miss Joan B. Procter: The Skull and Affinities of *Rana subsigillata*, A. Dum.

WEDNESDAY, MARCH 5.

ROYAL SOCIETY OF ARTS, at 4.30.—B. D. Porritt: The Rubber Industry—Past and Present.

GEOLOGICAL SOCIETY, at 5.30.—Col. T. W. Edgeworth David: Geology at the Western Front.

ROYAL AERONAUTICAL SOCIETY, at 8.—Capt. A. P. Thurston: The All Steel Aeroplane.

THURSDAY, MARCH 6.

ROYAL SOCIETY OF ARTS, at 4.30.—W. R. Gourlay: The Need for a History of Bengal.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—G. L. Addenbrooke: Dielectrics in Electric Fields.

CHILD-STUDY SOCIETY, at 6.—Miss S. Walker: The Training of Teachers from the Child-Study Standpoint.

CHEMICAL SOCIETY, at 8.—Prof. J. W. Nicholson: Emission Spectra and Atomic Structure.

FRIDAY, MARCH 7.

ROYAL INSTITUTION, at 5.30.—Prof. H. C. H. Carpenter: The Hardening of Steel.

SATURDAY, MARCH 8.

ROYAL INSTITUTION, at 3.—Sir J. J. Thomson: Spectrum Analysis and its Application to Atomic Structure.

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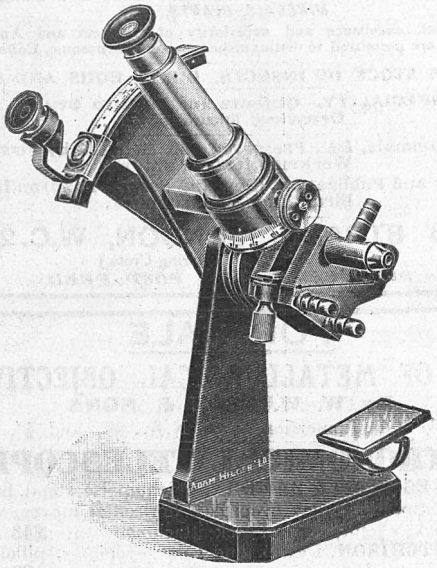

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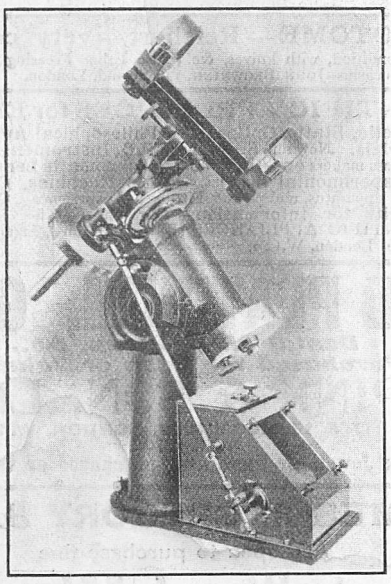

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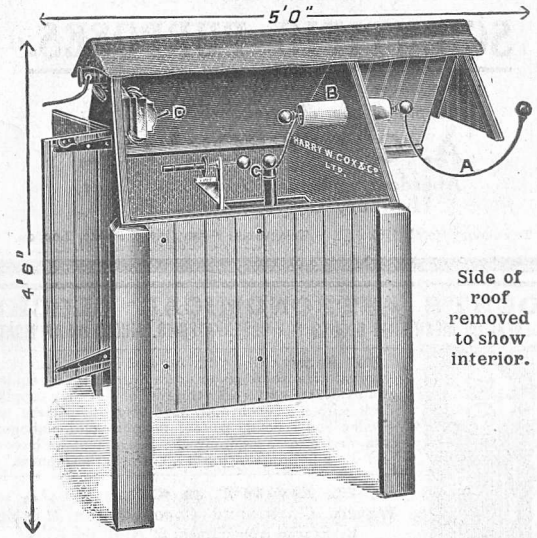

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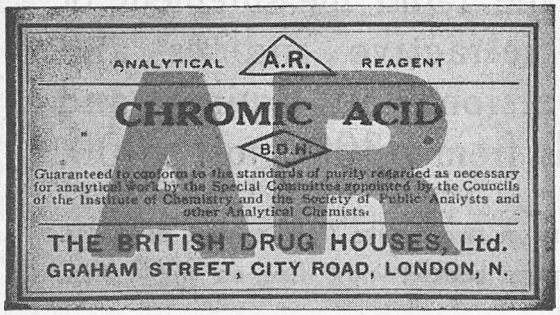

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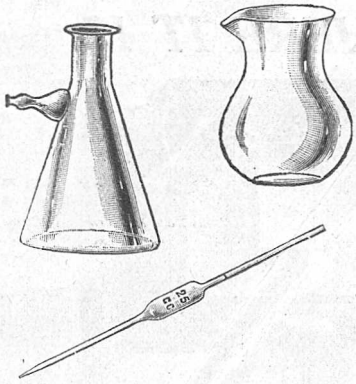

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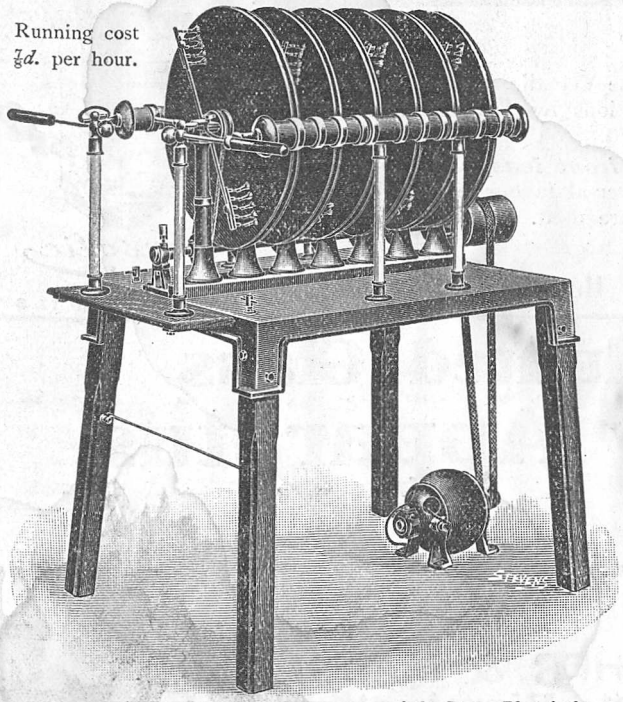

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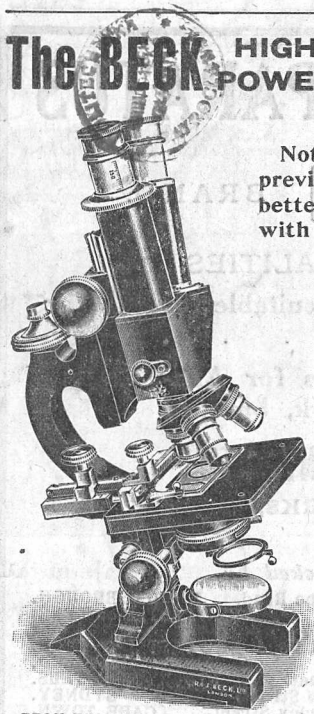

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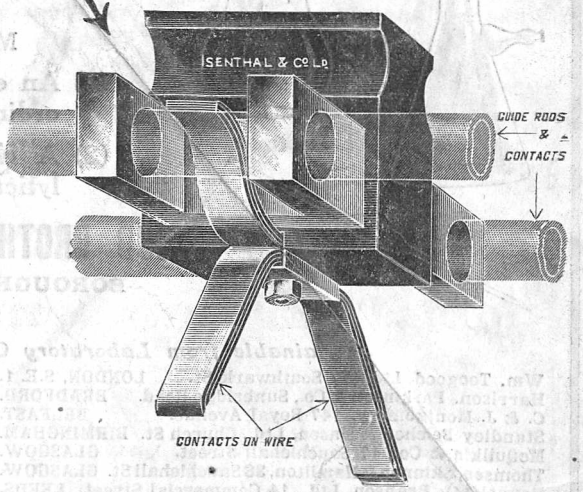

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