



SATURDAY, APRIL 18, 1931.

CONTENTS.

	PAGE
Scientific Medicine	581
Egyptian Mathematics. By T. L. H.	583
Physical Chemistry applied to Biology	585
Index Londinensis. By W. C. W.	586
Our Bookshelf	587
Letters to the Editor :	
An Egyptian Axe-head of date 1800 B.C.: its Investigation and Reproduction.—Sir Harold Carpenter, F.R.S.	589
Constitution of Rhenium.—Dr. F. W. Aston, F.R.S.	591
The Behaviour of Antiknocks.—A. Egerton, F.R.S., and L. M. Pidgeon	591
Pasteurised and Raw Milk.—Dr. R. A. Fisher, F.R.S., and Capt. S. Bartlett	591
Capture of Electrons from Mercury Atoms by Positive Ions of Helium.—C. F. Powell and Prof. A. M. Tyndall	592
Spectra of the Helium Glow Discharge.—H. McN. Cowan, W. L. Brown, and Dr. K. G. Emeléus	593
Isostasy.—Dr. J. de Graaff Hunter	593
Origin of Cosmic Radiation.—Sir James Jeans, F.R.S.	594
Chemistry of Vitamin B ₂ .—Dr. B. C. Guha	594
Embryology and Evolution.—Malcolm E. Macgregor	595
High-flying Egrets at Night.—Theodore B. Blathwayt	595
Fine Structure in the Mercury Singlet Terms: A Correction.—S. Tolansky	595
The Theory of Geological Thermal Cycles.—Dr. Harold Jeffreys, F.R.S.	595
Canadian Hydro-Electric Power Development during 1930. By Dr. Brysson Cunningham	596
Work of the Medical Research Council	598
The Paris Observatory	600
Obituary :	
Prof. Otto Wallach. By Prof. Henry E. Armstrong, F.R.S.	601
News and Views	602
Research Items	607
The Invention of the Sewing Machine	610
The Climate of Sweden. By E. V. Newnham	610
Afforestation Programmes of the New Zealand Forest Department	611
University and Educational Intelligence	612
Birthdays and Research Centres	612
Societies and Academies	613
Official Publications Received	615
Diary of Societies	615

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Scientific Medicine.

MUCH of the more important subject matter of the annual report of the Medical Research Council recently published, and dealt with elsewhere in this issue (p. 598), was brought to public notice by the newspapers as occasion arose. The establishment at University College Hospital of a department of clinical research is an example. Scientific results achieved or foreshadowed during the year under review were many and valuable, and to be able to say of such a year that it "illustrates the general features that have marked the progress of modern medical investigation throughout the world during the present generation" is an indication of solid attainment. Nevertheless, there are two sides to progress—progress in discovery and progress in organisation; and the phrase quoted is strictly relevant to an argument concerning the machine and its design rather than its output.

This argument, unobtrusive but intense, affords an answer to professional criticism, which, having filled out its voice in the correspondence columns of the *Times*, died away again last summer, its 'airy swellings', unlike the music in "Endymion", unrevived. They will be revived sooner or later, for the sufficient reason that "the study of disease as such is by no means the only field of medical research: it is a field indeed that work in all the other fields is actually aimed at reducing". For the time being, the Medical Research Council resolves this dualism within its own organisation; but it cannot resolve it elsewhere. It holds a balance between the claims of investigations which lead at best to results of professional and technological value and the claims of what the authors of the report call the "intensive pursuit of the more primary studies" that serve medical science.

Fortunately from an evidential point of view, unfortunately otherwise, what sort and standard of investigation is deemed specially desirable by the Council's critics is revealed by the plans in existence for a research laboratory in the grounds of Charles Darwin's house, where young men waiting for hospital appointments are to wait less unprofitably than they wait now. Since a feather would turn the Council's scale in favour of applications, and since the existence of a laboratory for experimental surgery might as easily increase as diminish the clamour for a more professional outlook, it is not to be counted altogether a gain that the poise within the Council itself is so delicately adjusted.

Work accumulates faster than funds. Increasing responsibilities are laid upon the Council by the growth of work within the range of the Therapeutic Substances Act. "This growing burden depends in part upon the advisory relations of the Council to the routine administration of the Act. For the rest, it consists in the active promotion of research work concerned with the preparation and use of standards of reference for the proper assay of biological substances." It is urged that such work for the protection and assistance both of the public and of the medical profession is valuable. Of course it is, and so is the part played by the League of Nations in gaining international adherence to common standards. It is urged that the Council is charged by Parliament with the duty of aiding "from a narrowly limited fund whatever, being needy, is most fruitful and most hopeful" either in applications or in fundamentals, and that this duty is onerous. Of course it is. It is urged that the curative work of the physician or surgeon is vitally important but is not the sole concern of medicine, which increasingly, step by step as knowledge advances, is concerned "with the sciences and arts of preventive work in all its kinds". "The science of nutrition, newly born almost within this generation, is bringing into sight new possibilities of greatly augmenting the preventive services of medicine and of setting in the middle of the picture not so much the attack upon declared disease as the establishment of right development and full health." The management of life, in industry and in the home, replaces the control of active disease.

It is harder to delimit the boundaries to be set to medical research than to describe its major concerns. The Council gives up the attempt, falling back upon the words of the Ormsby-Gore Research Co-ordination Sub-Committee: "Medical research deals by no means only with the cure of disease. It deals with the proper development and the right use of the human body in all conditions of activity and environment as well as with its protection from disease and accident and its repair."

Scientific medicine is no longer preoccupied by disease, which was "the earliest preoccupation of medicine". Yet the report asks us to "think of it" as being still so preoccupied, in order that we may appreciate the dependence of the modern clinical worker "more and more upon the tools and methods of the laboratory". Problems are taken from the bedside to the laboratory for their solution and there new problems are distilled for exploitation in the clinic. Was Emerson the origin

of this compensatory theme? "It is thus written, because it is thus in life. Our action is overmastered, and characterised above our will by the law of nature. We aim at a petty end quite aside from the public good, but our act arranges itself by irresistible magnetism in a line with the poles of the world." At all events, Emerson was equal to the theme to the end. If "an inevitable dualism bisect nature", compensation lurks: "the man or woman who would have remained a sunny garden-flower, with no room for its roots and too much sunshine for its head, by the falling of the walls and the neglect of the gardener, is made the banian of the forest, yielding shade and fruit to wide neighbourhoods of men".

It is to be hoped that the compensatory ingenuity of the Medical Research Council will equal the transcendentalist's in compassing the termination of its theme when the time comes. But that is not yet. "By far the greater part of the work the Council aid or initiate is done within the Universities or in Hospitals serving Universities. In this way the work gains not only from the intellectual freedom that belongs to University life and the opportunities that it brings of stimulating and recruiting youth, but it gains also by the use of material resources derived from other funds, both public and private, ancient and recent, without which not one half of the work now to be described could have been sustained." The weights are indeed exquisitely poised. It is, however, a wholesome reminder of realities to turn back a page or two to the confession that the contrasted (not compensatory in this case) tendencies of modern medicine, the extensive and the intensive, must each "bring its own difficulties". Nevertheless, it cannot be said that these have been obscured for readers familiar with them.

The Council, it seems, is marking time. It has arrived, as it were, at a definite stage in the race, the egg still in the spoon. Hints of future policy are scarcely discernible. A year ago there was some expectation of a policy of centralisation. It is not suggested in these pages. Praise of the universities is mere 'thank you', and gratitude is not always a vivid sense of benefits to come. Clinical research is policy active, and assay of biological substance an obligation. Policy waits on politics and the exchequer: whether England will prefer to receive modernisation at the hands of M. André Siegfried or Sir Oswald Mosley or will prefer not to receive it at all. It is all very well for Germans to remember "as an object-lesson of the conception of the State's functions,

that Prussia founded the University of Berlin in the days of her deepest political depression", in the words of General von Seeckt. Germany is not England, but a country that believes in what it calls "geistige Macht". Abraham Flexner ("Universities, American, English and German") may be right, and "To be frank, despite their great scholars and scientists and ours this sort of thing does not come easy to either Great Britain or America".

Flexner, an acute, if strongly individualised observer of the state of scientific organisation the world over, has it on the same page: "The creation of the University Grants Committee, the Medical Research Council, the Department of Scientific and Industrial Research indicates recognition of the fact that England lacks modern universities. The organisations just named give temporary relief—a block grant, support for a promising investigator or an important investigation. Such agencies are not superfluous; under all circumstances they have their uses; but they are no substitute for universities, amply endowed, amply equipped, and amply attended by a sufficient group of men and women dedicated to the search for truth. They seem to say: 'We lack developed universities. While we are waiting for them or in preparation for them, let us train this or that promising man, let us get this or that thing done.' It is all very well, but it does not answer." He calls the Medical Research Council "the one mitigating factor of importance" in Britain's unorganised and undeveloped resources in scientific medicine, and in this report we have the measure of its mitigation.

Egyptian Mathematics.

Mathematischer Papyrus des Staatlichen Museums der Schönen Künste in Moskau. Herausgegeben und kommentiert von W. W. Struve. Unter Benutzung einer hieroglyphischen Transkription von B. A. Turajeff. (Quellen und Studien zur Geschichte der Mathematik, Abteilung A: Quellen.) Pp. xii + 198 + 10 Tafeln. (Berlin: Julius Springer, 1930.) 48-80 gold marks.

THIS edition of the Moscow papyrus (complete with plates giving photographs of the whole of the text and a hieroglyphic transcription) has been eagerly awaited by Egyptologists and historians of mathematics alike. The volume is finely produced, and we can only congratulate the author upon the result of some three years' intensive study of the papyrus and all the literature of the subject of Egyptian mathematics. Egyptologists will in

due course have much to say upon it; the present notice will deal with it from the point of view of the mathematician only.

The papyrus, now in the Museum of Fine Arts at Moscow, formerly belonged to Vladimir Golenischchev, who bought it in Egypt in 1892-93 or 1893-94. It is said to have come from the necropolis of Dra Abū'l Negga, in the immediate neighbourhood of the place where the Rhind papyrus was found, namely, in the ruins of one of the small buildings near the Ramesseum. Written during the Thirteenth Dynasty, it was copied from an original of the middle of the Twelfth Dynasty, slightly earlier, if anything, than the original of the Rhind.

We have known something of the content of the papyrus since Turaiev published in *Ancient Egypt*, 1917, a paper on "The Volume of the Truncated Pyramid in Egyptian Mathematics" (problem No. 14 in Struve's numbering). A further paper by Zinzerling published in 1925 contained the translation and transcription by Turaiev of four more problems from the papyrus, three of which are geometrical. These three problems, together with that of the truncated pyramid, are the subject of a long and important article by Battiscombe Gunn and T. Eric Peet in the *Journal of Egyptian Archaeology* (vol. 15, 1929, pp. 167-185). As compared with the Rhind papyrus, the Golenischchev papyrus shows certain differences. Whereas the Rhind, although severely practical (there is only one hint in it of a general formula), has its problems arranged in distinct groups and is apparently a kind of handbook of instruction, the Moscow papyrus, where the problems are arranged anyhow, is more like an examination paper (with solutions); the suggestion of the editor is that it was in use, in a school for scribes, as a kind of test paper. The problem is given to the pupil by the scribe-teacher, "If thou art asked . . . do so and so"; the working is supposed to be shown by the pupil to the teacher, sometimes with the word "See!" added, and the teacher replies, "Thou hast found it correctly". The concrete numbers chosen for illustration are as simple as possible, so that there is none of the complicated arithmetical work which we find in the Rhind.

The problems (twenty-five in number) are rearranged by the editor in groups: (1) 'cooking-ratio' problems relating to the interchange of loaves and measures of beer according to the 'strength' of each, (2) simple rule-of-three problems, (3) 'hau' calculations corresponding to equations in one unknown, (4) problems of finding areas and volumes. We have also in the papyrus the operations of