

Imperial Cancer Research Fund*

THE tenth scientific report of the Imperial Cancer Research Fund is a substantial and profusely illustrated account of such of the researches carried out under the guidance of Dr. J. A. Murray as have not been published in the journals.

Five of the papers now published deal with the action of radium on tumours. The most important is by Dr. W. Cramer, who points out that a dose of radium radiation quite insufficient to kill cancer cells outside the body will often lead to the complete disappearance of growths to which it is applied *in situ* in the body. If a tumour irradiated in the body is after a few hours removed to another site in the same animal, it grows progressively. Hence, though radium has certainly some directly destructive effect on cancer cells, its main efficacy in curing tumours must be due to its action on the tissues of the host and so altering the surroundings of the tumour that it cannot survive. There is, as Miss Pullinger has also recently shown in human material, much damage to the blood vessels and also a great accumulation of leucocytes and other phagocytic cells, and it seems as if radium acts largely by encouraging the usually futile resistance which the tissues present to a growing tumour.

Dr. Cramer also shows that radium tends to inhibit or delay the carcinogenic action of tar. Dr. R. J. Ludford has analysed in detail the cytological effects of radium on a number of tumours, while Mr. Crabtree gives the results of an elaborate investigation of the influence of radium on the carbohydrate metabolism studied by Warburg's method. The results are

negative in the sense that no difference was found between normal and malignant tissues, and glycolysis, specially characteristic of cancers, was in fact more affected than respiration. He has also examined the action of radium on the succinoxidase ferment of muscle.

The other four papers, by Drs. Ludford and Foulds, are concerned with the reaction of tumours to vital staining with colloidal acid dyes. The chief results are that malignant cells do not segregate the dyes into their cytoplasm as normal cells do, and that the histiocyte series of phagocytic cells (which have a particularly intimate relation to vital stains) plays a substantial part in the resistance of the body to cancer, the details of which are at present not understood.

The thirtieth annual report of the Fund has also recently been issued. Among domestic affairs we notice with much regret that Sir Frederic Hallett has been compelled through ill-health to resign the post of secretary which he has occupied with such success since the foundation of the Fund thirty years ago. Appropriately enough, he is to be succeeded by Mrs. Harvey, daughter of the late Dr. E. F. Bashford, the first scientific director, who laid down the scope and objects of the Fund's investigations so well. The report also contains a very valuable summary by Mr. H. G. Crabtree of the present state of knowledge about Warburg's claim that the essential metabolism of the cancer cell differs from that of normal tissues. The claim has, on the whole, failed to stand the test of the voluminous investigations which it excited, but it has led to much interesting work and those who desire to know the situation as it stands at present cannot do better than consult Mr. Crabtree's account.

* Tenth Scientific Report on the Investigations of the Imperial Cancer Research Fund. Pp. viii + 203 + 55 plates. (London: Taylor and Francis, 1932). 30s.

Electrical Units

SEVERAL of the many interesting papers presented to Section 2 of the International Congress of Electricity held in Paris last summer dealt with electrical units. Thirty years ago the general opinion prevailed that the realisation of the 'international' electrical units was much easier than that of the so-called 'absolute' units based on the c.g.s. system, but experience acquired in the last twenty years has considerably modified this view. H. L. Curtis, in Paper No. 4, discusses the various methods in use for the measurement of current in 'absolute' c.g.s. units, and urges the furtherance of investigations. The determination of the ampere in the c.g.s. system of units can at present be carried out with an accuracy probably higher than that attainable in the determination of the 'international' ampere by the deposition of silver.

E. Giebe, in Paper No. 3, writing on the determination of the ohm in absolute units, discusses four methods, of which two are in use at the National Physical Laboratory, one at the Physikalisch-Technische Reichsanstalt, and one at the U.S. Bureau of Standards; he concludes that "the accuracies of realisation of the absolute unit of resistance and of the mercury ohm are about equal," and adds: "the international mercury unit in use up to the present has decreased in importance, and could be discarded. This view was adopted in 1929 by the Comité International des Poids et Mesures, who on the recom-

mendation of a committee of experts, decided to replace the international unit hitherto employed by the absolute unit, for technical as well as scientific purposes, and to accomplish the change as soon as a few more absolute measurements have confirmed our already accurate knowledge of the ratio of the two units."

Turning to the more technical papers, one by E. H. Rayner (No. 16) describes the electrostatic voltmeters and ammeters in common use at the National Physical Laboratory. The voltmeters, of the Kelvin multicellular type and all of the same range, are characterised by the lightness of the moving system, which weighs only 2.6 gm., although it comprises ten needles, a mirror and the damping device. Bifilar suspension secures great constancy of the zero point. The 130 volt range of the instrument is increased to about 40 kilovolts by resistance dividers, and to several hundred kilovolts by capacity dividers. The wattmeters are likewise made in one size only, have four quadrants and a single needle. "The three-electrode instruments used for measuring power and cognate magnitudes have been developed into wattmeters of a sensitivity and adaptability hitherto unattained by any other process. . . . A single instrument of each kind (voltmeter and wattmeter) with auxiliary apparatus consisting mostly of precision resistances, renders possible the measurement of almost all