This occurs where the metal has been handled with screwdrivers or spanners, and is apparently more marked when the handling is severe. It is less marked when the metal has not been handled heavily.

The physical experiments show that it is almost impossible to insert a screw without leaving some fragments of metal from the driver adherent to the screw. The amount increases markedly if any slip occurs during screwing. The steel used for the plates and screws is very resistant to corrosion, but that used for the screwdrivers and spanners is not. Measurements show that an appreciable difference in electrode potential can be set up between these two steels, so that they form an electrolytic couple which may have a harmful effect on the healing of the tissue and which will act as a corrosion centre. These physical observations may therefore offer an explanation of the surgical behaviour. Other factors which may play a part are the plastic deformation of the steel and the deformation of the protective oxide layers since these can alter the electrode potential. The effect of differential transfer can be diminished by a suitable selection of the metal used both for the driver and for the screws. We find, for example, that if the screws are made of 'Vitallium' alloy the amount of the driver transferred to it is very much less.

Analogous experiments in bolting operations show that the amount of metal transferred from the spanner to the bolt head is greater than that observed in screwing.

We thank Down Bros. and Mayer and Phelps, Ltd., for gifts of medical tools and screws.

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OBITUARY

Prof. E. P. Cathcart, C.B.E., F.R.S.

Edward Provan Cathcart, whose death occurred on February 18, retired in 1947 from the regius chair of physiology in the University of Glasgow after almost half a century of continuous devotion to the study of man as a whole; yet, shortly after he first graduated in medicine in 1900, he went to Germany to study bacteriology. There he came under the influence of Voit, whom he revered as a master. At the beginning of this century direct observations on human beings were largely confined to studies of metabolic processes. Such an approach appealed to Cathcart, and his appointment in 1905 to the newly founded Grieve lectureship in physiological chemistry in his own University gave his predilection full scope. In 1907 he published two classical papers on the metabolism of protein and of inorganic elements during starvation. He used Beauté, a *Hungerkunstler*, as subject. On himself he observed the influence of carbohydrate and of fat on protein metabolism.

Cathcart travelled widely; he studied in Russia with Pavlov, whose influence is shown in the publication of two papers on the gastro-intestinal tract of dogs. Cathcart never took kindly to work on lower animals; more to his liking was his work with Benedict in the United States on energy exchange in man during muscular exercise. Their joint monograph, "Muscular Work", which appeared in 1913, is a classic.

In 1915 Cathcart was appointed to the University chair of physiology in the London Hospital. The First World War was not a period wholly of frustration. He put his special knowledge at the service of the Armed Forces and of the country, and out of this phase arose his abiding interest in nutrition, in human food habits and in the physique of men and women. A monograph on the energy expenditure of the infantry recruit in training was written in collaboration with Lord Boyd Orr and published by H.M. Stationery Office in 1919. Many papers on similar topics appeared in the *Journal of the Royal Army Medical Corps*.

In 1919 Cathcart was invited by his own University to become the first Gardiner professor of physiological chemistry. In 1921 appeared his "Physiology of Protein Metabolism", one of the famous series of "Biochemical Monographs". Cathcart still kept alive his interest in metabolism, paying special attention to the influence of muscular work. With Markowitz he wrote a most acute analysis of the significance of the respiratory quotient, being rather impatient with the oversimplified naïve interpretations then current. However, a shift in the emphasis of his work gradually became apparent. Between 1924 and 1940, the Medical Research Council published five of his reports on the diets of families in different parts of Britain. Membership of the Industrial Fatigue Research Board (later Industrial Health Research Board), of which he was to become chairman during 1933–40, led to work on human physique and stature and to the appearance of two monographs, one on the physique of women in industry (1927) and another on the physique of man in industry (1935).

In 1928 Cathcart succeeded Noël Paton in the regius chair of physiology in the University of Glasgow. In his later years committee work and administration made increasingly heavy demands on his time; his colleagues in the Physiological and Biochemical Societies saw progressively less of his spare dynamic figure. Yet he kept alive his interest in the implications of physiological knowledge for social welfare, he did some little work on psychology, and his last scientific publication in 1948 dealt with histological work on the innervation of the nipple.

Cathcart's work, in spite of its seeming diversity, was all of a piece. His early studies on metabolism, on the alimentary canal and on energy exchange in man led on smoothly to his later work with its wide social implications.

Without being reactionary, Cathcart had yet a sceptical habit of mind. The new and the novel in physiology and in social science had less appeal than the established facts and accepted attitudes of the past. Facts were naturally sacred; but comment, he felt, ought not to be too free in view of our essential ignorance of the functioning of the integrated organism as a whole. Thus Cathcart resisted what he regarded as excessive emphasis on the importance of vitamins and of 'minerals' in nutrition; 'nature' to him was as important, if not more important, than 'nurture'. Yet he was a most stimulating teacher, in his personal relations he was kindly and sympathetic, and he went to endless pains to encourage and to help young workers. It is to be doubted if we shall see again anyone so well versed in the broad principles of human biology.

R. C. Garry