International Mathematical Congress Medals

EVERY four years there is held an international gathering of mathematicians, known as the International Congress of Mathematicians. At the next meeting, to be held in Oslo in 1936, two gold medals will be awarded to mathematicians selected for their outstanding contributions to mathematics by an international committee appointed for the purpose. The foundation of these medals is due to the efforts of the late Dr. J. C. Fields, research professor of mathematics at the University of Toronto. Dr. Fields was responsible for assembling the Mathematical Congress in Toronto in 1924—the only meeting which has been held outside Europe—and was president of the Congress and the editor of its *Proceedings*, which constituted two large volumes, published by the University of Toronto Press. With funds remaining after the completion of the work, Dr. Fields suggested the foundation of these medals, as a Canadian contribution to the cause of international scientific co-operation, which he always had much at heart. Unfortunately, Dr. Fields did not live to see the realisation of his scheme, as he died in August 1932, a month before the meeting of the Congress in Zurich, which gave international approval to the foundation of the medals. The medals will be awarded at each International Congress of Mathematicians in future.

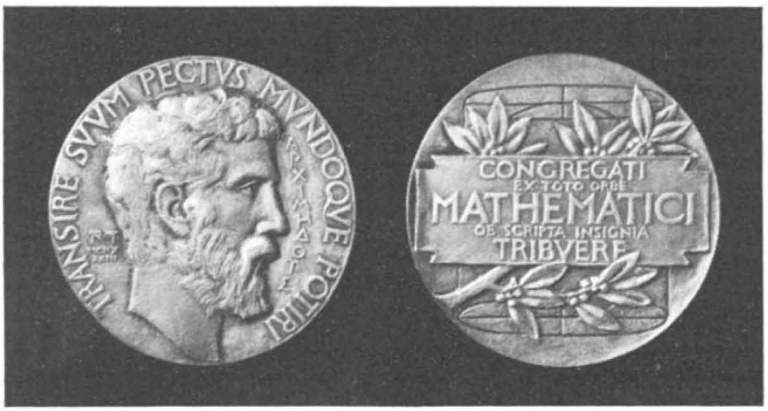

FIG. 1. Medal of the International Mathematical Congress.

In spite of the fact that the medals are of Canadian origin and are due to the personal efforts of Dr. Fields, it was his particular wish that in design and award they should be truly international in character, and should not be associated with any country or person. The task of designing a suitable medal was entrusted to the distinguished Canadian sculptor, Dr. R. Tait McKenzie, R.C.A., who has now completed his work (Fig. 1).

The medal is two and a half inches in diameter. The obverse shows the head of Archimedes facing right. As there are no authentic portraits of this perhaps greatest of all mathematicians, recourse was had to the fine collection of more than thirty pictures collected by Prof. David Eugene Smith, and placed by him in Columbia University. They show the idea of as many artists, ancient and modern, of what Archimedes may have appeared to be. They naturally vary greatly, so the sculptor followed his own impression from reading his life and works. He shows the sage as a man of mature age, vigorous, with curly hair and beard, straight Greek nose and prominent brow. In the field is the word "Archimedous" in Greek capitals, and the artist's monogram, "RTM" and "MCMXXXIII".

The inscription surrounding it is: "Transire suum pectus mundoque potiri", which may be freely translated: "To transcend one's human limitations and master the universe." This appropriate quotation from the Roman poet Manilius was supplied by Prof. Norwood of the University of Toronto.

The reverse has a label bearing the inscription: "Congregati ex toto orbe mathematici ob scripta insignia tribuere", which may be freely translated: "Mathematicians gathered together from the whole world honour noteworthy contributions to knowledge."

Behind the label is a laurel branch, and cut in the background can be made out the diagram of a sphere contained in a cylinder. The determination of the relation of these two was one of the outstanding achievements of Archimedes, and this diagram was engraved on his tomb. The name of the recipient will be cut on the edge of the medal and will not interfere with the design.

Narcosis and Mental Function

IN a paper read before Section J (Psychology) of the British Association at Leicester, Dr. J. H. Quastel, director of the Research Laboratory, Cardiff City Mental Hospital, gave an account of recent experiments with narcotics. The evidence points to narcotics acting primarily by producing a state equivalent to anoxæmia at the particular parts of the nervous system where they are absorbed. Also the psychological effects of narcosis and of oxygen want are very similar to each other.

The narcotic drugs tested have the common property of inhibiting, at low concentrations, the oxidation in the nervous system of substances important in carbohydrate metabolism, such as glucose and lactic acid, for which the effects are practically specific. If certain other substances are investigated which are freely oxidised by the brain, this inhibition of oxidation does not take place. The main effect of the narcotic appears to be at the nervous cells, where it interferes with the activation of the lactic acid molecule, a process which is necessary before its oxidation can take place. The narcotic and the lactic acid compete for the cell catalysts involved in the activation process.

The following picture may be given of the mechanism of narcosis. Absorption of the narcotic takes place from the blood stream at a nervous centre. There it competes with lactic acid for the

cell catalysts, hindering the access of lactic acid to these catalysts and lowering the effective concentration of lactic acid available for oxidation. Hence the supply of energy is diminished; this produces a decrease in functional activity of the nervous centres in question and narcosis may ensue. It is clear from experiments—although much has yet to be done—that any mechanism resulting in deficient carbohydrate or lactic acid oxidation in the nervous system may well play a part in causing disorders of the functional activity of the nervous system.

The interesting question of the possibility of certain psychotic disorders having their origin in a state equivalent to oxygen deficiency at certain parts of the nervous system is thus raised. Evidence in favour of this possibility would be forthcoming if it could be shown that the body itself can produce substances which behave in a manner similar to narcotics. This seems to have been accomplished by Quastel and other investigators at Cardiff. They have found that certain substances, mainly breakdown products of tyrosine and tryptophane, have precisely similar effects to those of the narcotics on the oxidation of glucose or of lactic acid in the brain at equivalent concentrations. Mescaline has a similar effect. Most of the substances in question—tyramine, indole, and so on—are normally detoxicated in the body (chiefly in the liver), so that not more than traces can normally circulate in a healthy individual.

A disturbance in hepatic functions, however, makes it not difficult to visualise the presence in the blood of more than ordinary amounts of these toxic substances, and their circulation over a long period would create a condition in the nervous system the psychological effects of which would be expected to resemble those found in anoxæmia or light narcosis. Experiment has yet to show such a disturbance in detoxicating processes among certain psychotic types and attention is being focused on this problem.

Prolonged narcosis as a therapeutic method, which seems to be satisfactory in certain cases in that it brings about an improvement in the mental condition, has been used in recent years. Many, however, have abandoned it because of the production of toxic symptoms from the administration of the drug, which necessitated the cessation of this method of treatment before recovery was assured. A modified treatment of giving the patient a dose of glucose and an injection of insulin at the same time as the administration of the drug has proved very successful. Ketonuria and other serious complications cleared up and the narcosis treatment became practically safe.

Constitution of the Alloys of Iron and Manganese

THE latest contribution to the really remarkable work on the alloys of iron which has been carried out now for many years at the National Physical Laboratory is a paper by Dr. M. L. V. Gayler on the manganese-iron alloys, which was read at the meeting of the Iron and Steel Institute in September.

Fundamental work of this category demands as a preliminary the preparation of the elements themselves in a state of high purity. The iron employed

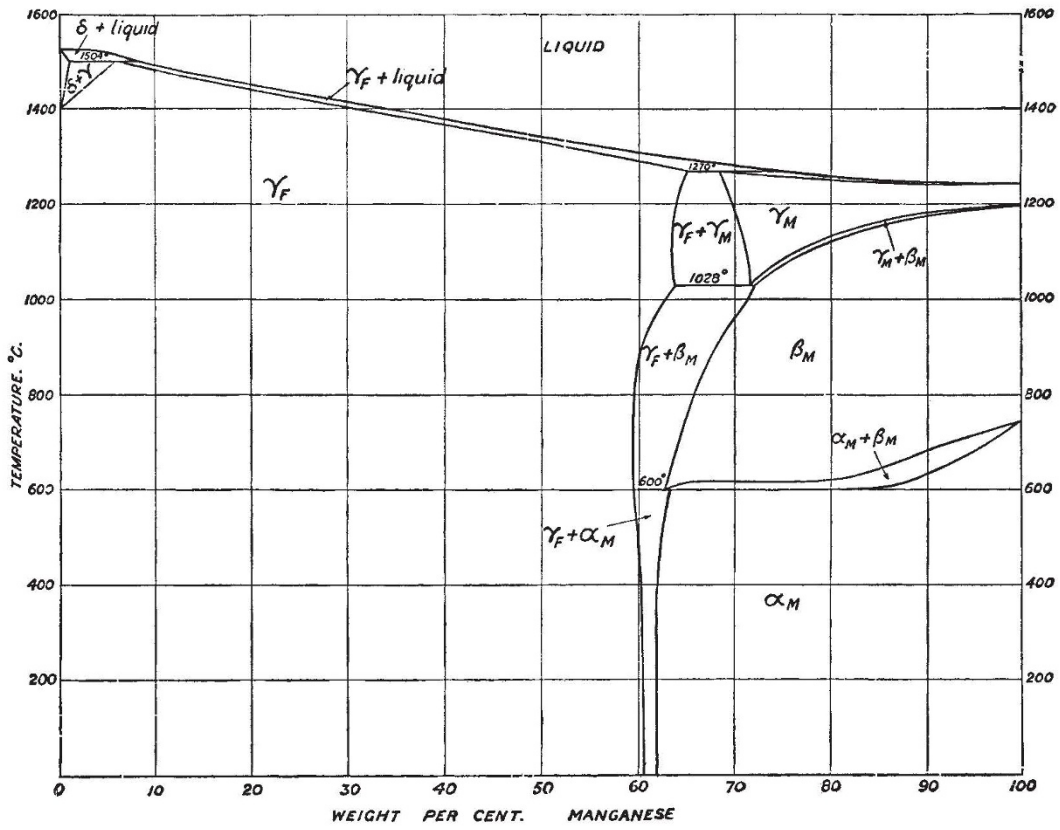

FIG. 1.