A perusal of the very full and interesting chapter on the chemical nature of organismal differentials will probably convince most readers that future advances in the subject are to be looked for as the result of the efforts of serologists and chemists working in collaboration.

The author concludes with several chapters on more general aspects of the subject, dealing with psychical-social individuality, individuality and the world, and the evolution of individuality. These, however, come more within the sphere of philosophy and are outside the competency of the reviewer.

This book, which embodies the life-work and thought of its author, and includes a critical and almost encyclopædic account of the work of others, will be invaluable to all workers on the subject of individuality and, in view of the wide field covered, will greatly interest many of those working on allied subjects, as suggested in the preface.

C. TODD.

STIMULATING INDUSTRIAL ENTERPRISE

Refrigeration in the Engineering Industry

Pp. xii+69 (typescript). (London: O. W. Roskill and Co. (Reports), Ltd., 1945.) 42*s*.

IT is generally agreed that in the industrial organization which will follow the War it will be necessary for each manufacturer to take full advantage of any technological advances which may be applicable to his particular work. The object of the present report is to help manufacturers of refrigerating plant by pointing out to them some of the fields in which refrigeration can be applied, and conversely to help those engaged in industrial processes where refrigeration would be helpful.

The first suggestion which is offered relates to the maintenance of upper-air conditions in rooms where tests or development of aeronautical instruments, engines or components may be carried out. Here, it is evident that no one wishing to test such appliances under conditions approximating to those which they will meet in service would overlook the need for refrigeration, though it is possible that refrigerating engineers might overlook the special needs, and the potential market, of this application. What the report does is to describe, in not very great detail, the installations which have already been set up for this purpose.

Another application is to the age-hardening alloys. As is well known, after heat treatment, these alloys alter in constitution at temperatures so low as ordinary room-temperature; in many cases it is essential to use them before the age-hardening has taken place, which often means, within two hours of the heat-treatment. Now, by storing them at really low temperature, the age-hardening can be delayed, so that it becomes possible to store the articles for periods of the order of a week. The obvious gain to a manufacturer, who needs, say, a stock of rivets, is immense, if he is relieved of the necessity of matching the supply always to the demand.

There is another metallurgical field in which refrigeration may be of use, namely, in the ageing of iron and steel castings, either by removal of mechanical stresses or by accelerating the changes in constitution which occur when the metal is cooled. There is some divergence of practice in this subject, and the conclusions reached by several workers are outlined in the report. It is noticeable that all the descriptions and references are taken from the work of practical engineers, that of physicists and the more academic metallurgists being ignored. It is probable that more careful consideration of their results and conclusions would either reconcile or explain the divergences of practice mentioned.

The older method of making a shrink fit is to heat the member which is too small until it just fits the other; obviously, where the one that is too large is more easily manipulated, refrigeration can help by providing means of cooling this member until it fits the smaller. Examples of this method are given, and will no doubt suggest other cases to enterprising readers.

This part of the report closes with an account of the attempts which have been made to apply local cooling to welding-electrodes, and of other miscellaneous applications, one of which (the desiccation of air supplied to furnaces) is simply a special application of the problem of air-conditioning, an art which refrigeration engineers have certainly not neglected in the past few years.

The second part of the report reviews refrigeration plants themselves, mentioning what has been done to produce multi-stage machines and to make absorption and cold-air machines practicable. Its value will therefore be mainly to the manufacturer, and less to the purchaser or prospective purchaser of a plant, though the latter may benefit by having this conspectus of types available, and may be enabled to put his inquiries direct to a firm specializing in the kind of machine best suited to his problems.

From this account, it will be seen that the report, while offering suggestions for new work or methods of working, to manufacturers and others, does not make new, original suggestions, but simply displays for consideration the more novel processes or devices already used and described. Clearly this is a legitimate activity for business consultants to engage in, and it is apparently found to be useful, for this is at least the fourth report published by the same firm. At the same time, if these reports are useful, the question presents itself whether a much larger series, covering indeed all the main branches of technology, may be needed, and whether it would be better undertaken as a definite series under the guidance of some such body as one of the engineering institutions.

Chemists already have reviews of this sort, one for pure chemistry and one for applied, while physicists have the "Progress Reports" and the (American) *Physical Reviews*. All these publications find a ready sale, and it is at least possible that similar reviews, in which an engineer engaged in one part of the industry might rapidly survey the advances in other parts, would be equally valuable. Another means by which engineers could be kept in touch with advances in regions other than their own would be an abstract journal, but experience seems to show that engineers are not attracted by these.

If either a journal of reviews or one of abstracts is desirable, it is clearly for engineers to say which they want, how detailed the reviews should be, and how the journal should be directed. It is to be hoped that some responsible body will take up this inquiry. Meanwhile, reports such as the one under review will help to show what could be done.

J. H. AWBERY.