

with the machine upside down), it is still a matter of contention as to the absolute degree of efficiency which is required in regard to the labyrinthine mechanism.

On the other hand, in regard to the aural examination, it is beyond doubt that the candidate must have good hearing, if only to detect the noise of defective working of his machine, and also healthy tympanic membranes and uncongested Eustachian tubes, so that he may readily adapt himself to varying changes of pressure.

Good muscular sense is of great importance in a candidate, since there is reason to believe that normally this plays intuitively a considerable part in the accurate balance of a pilot and his machine. Particular attention, therefore, is directed to this point at the British Aviation Candidates' Board.

In regard to reaction times these have been fully investigated by the French authorities, but with the present large demand for candidates for the Air Force it is impossible and unnecessary to carry out such tests in great detail, since during his training this is done to a certain extent by his instructor, and the candidate eventually allotted to the type of machine for which, in this respect, he is found most suitable. This, however, does not mean that such tests should not be applied in special cases.

The flying temperament, it must be confessed, rather baffles assessment, and at the present time it is difficult to eliminate the candidate who may develop an "anxiety neurosis," and therefore later become unsuitable for flying.

Valuable information is obtained from previous medical history, and, to a certain extent, from family history; it is deemed inadvisable, as a general rule, to accept any candidate who has a previous history of serious respiratory trouble or nervous breakdown of any kind. In regard to a history of concussion, however, it has been found that 40 per cent. of successful pilots give a history of concussion of varying duration. Therefore, if at the time of examination there are no signs of nervous instability, it shows that the candidate has a nervous system which can recover well from the effects of concussion. Also the history of the accident leading to such concussion frequently reveals a degree of enthusiastic recklessness characteristic of the "flying" temperament, and for this reason the subject is likely to make a good pilot.

MARTIN FLACK.

THE ZINC ORE RESOURCES OF THE EMPIRE.

THE Mineral Resources Committee of the Imperial Institute has arranged for the publication of a series of monographs on the mineral resources of the Empire, of which the first, dealing with zinc ores, is now issued. Copies of this monograph are obtainable at 2s. each, post free, from the Imperial Institute.

Mr. S. J. Johnstone has been chiefly responsible for the work of compilation, and Mr. T. Cook for that of general revision. They have been assisted by Mr. W. S. Robinson, vice-president of the Aus-

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tralian Metal Exchange, and a member of the Imperial Institute Committee for Australia.

In issuing these monographs, the aim of the committee is stated to be not so much to cater for the specialist as to diffuse knowledge of the Empire's mineral resources among those who control and sell them and those who use the products to which they give rise, in the hope that the dissemination of such information will lead to a greater utilisation of these resources within the Empire itself than has been the case in the past.

Although large quantities of zinc ore were mined in the Empire before the war, nearly all the product was exported to and smelted in Germany and Belgium. Thus in 1913, although the Empire produced 20 per cent. of the world's output of zinc ores, its total production of the metal (spelter) was only 6.4 per cent. of the world's output, and not quite half of this was primary or virgin spelter, the remainder being secondary (re-melted) metal. Germany and Belgium, on the other hand, produced about 48 per cent. of the world's annual supply of spelter, although they themselves contributed only 23 per cent. of the world's output of zinc ore, the rest of their supplies being obtained from the famous Broken Hill concentrates shipped from Australia.

In the last pre-war year Germany led the way in ore-production, followed by New South Wales, the United States of America, Spain, and Italy, in order of magnitude. These are the principal ore-producing countries.

The most important ore-minerals of zinc are the sulphide, ZnS, known as zincblende and also as sphalerite, and the carbonate, ZnCO₃, known as calamine and sometimes also as Smithsonite; the former is by far the more important source of the metal. Special mention should also be made of Franklinite, a mangano-ferrate of iron, manganese, and zinc, found in large quantities in New Jersey, U.S.A., which is a source not only of zinc, but also of ferromanganese. The silicate ore, hemimorphite, 3ZnOSiO₂ + H₂O, also serves as one of the minor sources of the metal.

Zinc ores occur, and have been mined for some time, in many parts of the United Kingdom; of these a considerable proportion were exported before the war to the Continent for smelting. On the other hand, ores from foreign countries have, at the same time, been imported and smelted here, a condition of things which would be incredible if it were not true.

The most considerable source of zinc ore in the Empire is the deposit in the Broken Hill district, New South Wales, which is situated at the southern extremity of the Barrier range. The extreme length of the ore-bearing ridge is about two miles, and the report gives information as to how the ore changes in passing from the oxidised outcrop to the unaltered sulphide minerals below.

Stated very briefly, this monograph gives, in the first place, a short statistical account of the world's production of zinc ores and zinc, and describes the ore-minerals; then follows a section devoted to the principal ore-deposits of the Em-

pire, special attention being given to Australia, the United Kingdom, Canada, and India, which are the principal British sources of supply; next come references to the more important deposits in foreign countries; then follow sections dealing with the valuation, concentration, and smelting of the ores, the various types of the commercial metal (spelter), with references to impurities, grades, and prices; the final section deals with the properties and utilisation of the metal, whether as such, in the form of alloys, or pigments.

There is an obvious misprint on p. 54 where it is stated that the distillation retorts are "about 8 ft. in diameter." For "feet" read "inches."

THE DECLINE IN THE BIRTH-RATE.

IN a judicial way Dr. Millard discusses, in the paper before us,¹ the problem of the fall of the birth-rate in its relation to social welfare. He does not share the orthodox view that the decline of the birth-rate is in itself a deplorable fact, or that deliberate birth-control is necessarily to be regarded with disapprobation. On the contrary, he advances substantial arguments in support of the following conclusions. The fall in the birth-rate is a general phenomenon among civilised nations. It is due, not to diminished natural fertility, but to deliberate birth-control. It is not in itself an evidence of national decadence; it may be an expression of advancing civilisation—of a more conscious control of life. Birth-control is the civilised substitute for those natural checks to the rapid growth of population—scarcity, disease, and war—which have always operated in the past. Rapidly growing populations in countries with circumscribed territories are apt to give rise to political unrest and to serve as provocatives to war. International competition in birth-rates is correlated with a competition in armaments, and both are undesirable.

The prosperity of Britain is at present wrapped up with the abundant supply of cheap coal, and the more rapidly the population of this country increases, the sooner will the beginning of the end of our coal-fields manifest itself. To postpone the approach of what the author calls the dark and gloomy epoch (who knows what other stores of energy may not be tapped before the coal is exhausted?), an increased birth-control may usefully operate. But there are more immediate reasons for advocating birth-control. It is far from being race-suicide; it is a natural ally of the maternity and child welfare movement. A low birth-rate is closely correlated with a low rate of infantile mortality. A high birth-rate usually means great infantile mortality. "Birth-control is an essential factor in the campaign against poverty. It is calculated to reduce the supply of unskilled labour, to increase efficiency, to raise wages, and to encourage a higher standard of life." It seems almost as sure a panacea as Prohibition!

¹ "Population and Birth-Control." Presidential address to the Leicester Literary and Philosophical Society, 1917. By Dr. C. Killick Millard. Pp. 48. (Leicester, 1917.) Price 1s.

We think, indeed, that Dr. Millard is altogether too enthusiastic over birth-control as we know it at present. Perhaps its methods are improving; but there seems more than a touch of irony in the statement that married people, if in doubt as to the best methods of birth-control to be adopted, "will naturally look to the medical profession for advice." How abundant and helpful that expert advice has been during the last quarter of a century!

The author has a fine passage on the joy and discipline of parenthood, and we agree with him that the availability of trustworthy counsel will encourage early marriages, which are on the victory side, we hope, in the campaign against "immorality" and venereal diseases. In any case, there is much to be said for Dr. Millard's summing-up, that "properly used, and not abused, birth-control is a valuable eugenic instrument, capable, by restricting the multiplication of the least fit, of greatly raising the quality of the race."

SIR ALEXANDER PEDLER, F.R.S.

THE announcement of the sudden death of Sir Alexander Pedler, while attending a Committee meeting at the Ministry of Munitions on Monday, May 13, came as a shock and great surprise to his many friends. There had been, among the majority of them, no suspicion of weakness, and to all appearance he was a man who might confidently look forward to many more years of useful work.

Pedler received his early education at the City of London School. The present writer made his acquaintance in October, 1866, when, at the age of seventeen, he won a Bell scholarship and began work as a student in the laboratory of the Pharmaceutical Society. Here he went through the usual course of analytical work, and at the end of the session was awarded a certificate of honour in practical chemistry. Before leaving, he began a piece of research suggested to him by the writer, who was then demonstrator in the school. It was with great regret that he parted with the promising young student, who had, by this time, decided to leave the comparatively narrow field of pharmacy and proceeded to place himself under Prof. (afterwards Sir Edward) Frankland at the Royal College of Chemistry, then in Oxford Street. There he soon entered on research and carried out the separation of the amylic alcohols by Pasteur's process. From the optically active and inactive alcohols thus obtained he prepared the corresponding valeric acids, and gave an account of the work to the Chemical Society in 1868 (J. Chem. Soc., N.S. 6, 74). Further work in this direction was interrupted by his taking part in the solar eclipse expedition of that year.

From 1871 Pedler served for two years as lecture demonstrator to Sir Edward Frankland in the Royal College of Chemistry in succession to Mr. Herbert McLeod, who had been appointed to the professorship of chemistry in the then newly instituted Royal Engineering College at Coopers