environment do not affect intelligence quotients of children to any great extent. A brief mention of the South African Group Intelligence Tests results was made. The average I.Q. of 3281 'poor white' children of ages 120 to 155 months showed a definite tendency to sink with increase in chronological age, which is ascribed to unfavourable environmental conditions under which the 'poor white' child lives.

In Section A astronomers dealt with the cause of a nova outburst, second order terms in differential refraction in the measurement of photographic plates, comparison between observations on a comet and an ephemeris and the expanding universe. Meteorological papers were concerned with Rhodesian rainfall and the meteorite at M'Bozi, Tanganyika. Soil reclamation and water provision in arid countries were of much interest and the goodness of fit of Dieterici's equation was discussed. Engineers were interested in papers on induction heaters, electric current and the human body, and road construction and maintenance problems in South Africa. An interesting paper was contributed on the historic determinations of the longitude of the Cape.

In Section B papers of chemical interest dealt with the sugar-acid relationship in oranges, the essential oils of *Empleurum serrulatum*, the recent results of plant poison work, the value of valve potentiometers in physico-chemical work, and electrically heated vacuum desiccators. Accounts were given of the mineral springs of South Africa and of the register of medicinal waters of the country. Natural products of the Union such as Iceland spar and the clay responsible for the ceramic industry at Grahamstown were of interest, as was the paper on the products of native iron smelting. The nature and significance of the soil colloidal complex interested geologists and agriculturalists alike.

In Section C important papers on germination of wattle seeds, the germinating capacity of certain native South African seeds, on the vegetation of Natal, and on the siccation process were contributed. In systematic botany there were revisions of the genera *Lopholæna* and *Sutherlandia*, the evolutionary tendencies of the Labiatae, new species of *Juncus*, and the parasitism of *Harveya*. Mycological papers dealt with new species of South African fungi, bacterial diseases of grain, physiological forms of *Puccinia graminis*, anthracnose of almonds, and new diseases of potatoes. Agricultural problems included studies in pasture management, grass or bush in the Karroid areas, physical properties of wattle soils, soil depletion, experiments on the control of *Selago*, and the fertility factor in turf production.

In Section D a number of interesting new parasitic Protozoa and the Protozoa from Kalahari soils were described. A series of papers dealt with various Amphibia from the points of view of morphology,

osteology, and economics. The mammalian basicranial axis and the descent of the mammalian vomer from the reptilian parasphenoid were discussed. The embryological development of the beetle, *Euryope terminalis*, was described and beautifully illustrated. Methods of marking insects taken at regular intervals in quantitative samples, the therapeutic uses of de-toxicated snake venom, and fish mortality were of interest. The native beliefs concerning pregnancy and child-birth, with their effects on public health administration, formed a useful practical contribution. A series of papers dealing with sheep and wool research, density and staple length, variation in the merino fibre, correlation between crimp and diameter of wool, and the blowfly menace were taken in a special sheep and wool subsection. Fine exhibits of small mammals from south-west Africa, of deep-sea fishes, of extinct mammals associated with the Taungs skull, and of curious letter-like markings on the mouth of a snoek were displayed.

In Section E an account was given of Bushman paintings at Quthing, Basutoland, and of the present-day Basuto copies of them, the skeletal remains of cave dwellers of the Outeniqua Mountains were described, and also skeletal material from early graves in the Riet River valley. The traces of Bushman occupation in Tanganyika Territory were detailed, and an interesting historical and philological investigation of the lost tribes of the Cape was given. Artefacts from Melkhoutboom and implements from Healdtown were described, also rock engravings and suggestions as to their significance and age. Superstitions of coloured people in Knysna and traditions connecting the Bantu and Zimbabwe were discussed, and a paper on native music dealt with the mystery of the Grand Gom-gom.

In Section F papers of much economic interest dealt with provincial councils from the point of view of political science, with indirect rule in Tanganyika, and with an analysis of the contributions to family support of women workers on the Witwatersrand. The quantitative valuation in ethics and the question of the retention of the distinction between sensation and perception were considered. Educationists were interested in investigations into intelligence tests in South Africa and in experiments in vocational guidance. Two papers of much historic interest dealt with the making of a Cape governor, Sir Benjamin D'Urban, and with early revenue and taxation in South Africa. Another most interesting paper dealt with the new cosmology in its historical aspect, Plato, Newton, and Whitehead being considered. An account of the International Institute of Intellectual Co-operation was given at a meeting of all sections.

The next annual meeting of the Association will be held at Durban in July 1932, under the presidency of Prof. P. J. du Toit.

H. B. F.

Metallurgical Spectrum Analysis.

TWO papers on metallurgical spectrum analysis, presented at the recent meeting of the Institute of Metals at Zurich, "Application of the Spectrograph to the Analysis of Non-Ferrous Metals and Alloys", by H. W. Brownsdon and E. H. S. van Someren, and "The Spectrographic Assay of some Alloys of Lead", by D. M. Smith, represent the latest developments of a method of metallurgical analysis which appears to have been first suggested and used by W. A. Miller, assayer to the Mint, in 1863. The theory and technique of metallurgical spectrum analysis were elaborated by physicists having academic interests, but it is noteworthy that the present papers, and others

recently published, emanate from the research departments of industrial concerns—Imperial Chemical Industries, Ltd. (Metals), and the British Non-Ferrous Metals Research Association; moreover, these papers indicate that spectrographic methods have been adopted for particular routine assays. Now that the importance of the presence of small quantities of foreign metals in alloys is appreciated, though in individual cases the quantitative relations may be quite unknown, it is customary for specifications to set rigorous limits for the content of these foreign metals permissible; limits which, in the absence of precise knowledge, are often very low. It is in the

works control of the production of such alloys that the methods described in these papers are particularly valuable.

The method most favoured by these writers is the simplest available, and it is the one most capable of general works use, since the instrumental routine does not require a high degree of technical training in the operator: reading and interpreting the spectrograms requires more training. Direct visual comparison is made of the spectrogram of a standard alloy with the spectrogram of the alloy to be assayed. For the examination of brasses, the authors of the first paper use a pair of electrodes, the positive being pure copper, the negative being the sample to be assayed. Spectra of arcs of all the standard alloys are run in this way and photographed with the standardised routine, and from an examination of the spectrograms, tables are prepared showing the relation between the intensities of the lines of the metal being determined and neighbouring copper lines. An example is shown in the accompanying table.

MANGANESE IN BRASS.

Manganese Line.	2949.	4236.
<i>Manganese, per cent</i>		
0.01	<i>b.v.</i> < } Cu	
0.02	= } 2858	
0.04	> }	
0.1	< } Cu	
0.2	= } 2997	
0.3	> }	
0.4	< } Cu	
0.8	= } 2883	
1.6	> }	
	< } Cu	
	= } 2961	
	> }	
		< } Cu
		= } 4249
		> }

b.v. signifies barely visible.

The spectrogram of the sample to be assayed is taken with the same routine, and by a comparison of the intensities of the manganese line 2949 with the copper lines 2858, 2883, 2961, and 2997, and of 4236 manganese with 4249 copper, the manganese content of the brass is determined.

For the examination of lead alloys, a high tension spark discharge was used, both electrodes being of the metal examined. Relative intensity tables were prepared, in which the pairs of lines to be compared consisted of one line of the metal to be determined and a neighbouring lead line, but were otherwise similar to Table 1.

Preliminary experiment must be made to determine whether arc or spark excitation shall be used, what the arc or spark gap shall be, whether a condensing lens is to be used, and to standardise care-

fully the electrical conditions of the excitation and the photographic technique. It is evident from the papers under review and others recently published that different workers evolve different routines to suit their particular problems and equipment. Such papers as the present ones are valuable in that they give complete working details for the determinations of which they treat, as shown in the following table.

Alloy.	Metal determined.	Percentage range for which data are available.	
Brass	Lead	0.005	5.0
	Tin	0.005	1.3
	Iron	0.005	1.2
	Nickel	0.01	15.0
	Aluminium	0.01	2.0
	Manganese	0.01	1.6
Lead alloys	Tin	0.002	9.0
	Antimony	0.03	15.0
	Cadmium	0.0001	1.0
	Arsenic	0.03	1.5
	Bismuth	0.0003	0.15
	Copper	0.0002	0.06
	Zinc	0.001	0.06
	Silver	0.0006	0.002
	Thallium	Data for	0.001
	Mercury	Data for	0.005

In some cases these figures do not represent the extreme limits over which the methods can be used, but those which the writers have used in practice. When most of the observations will involve very small quantities, a modified procedure with longer exposure and development will be used; while for determinations which are mostly more than one per cent, it will often be advantageous to use the logarithmic wedge sector referred to later.

D. M. Smith deals, further, with the preparation of standard alloys, an important preliminary to putting a spectrographic routine into works operation; and with a more refined method of making the intensity comparisons. A simple spectro-photometer, the logarithmic wedge sector of Scheibe and Neuhäusser, is used: its use gives not so much an increased accuracy as an extension upwards of the range over which the equipment may be used for making determinations.

The accuracy to be obtained from both these methods is about ten per cent of the amount of the constituent present, over the range for which the method is applicable. Thus 0.1 per cent would be returned as between 0.09 and 0.11 per cent; 10 per cent would be returned as between 9 and 11 per cent.

A. A. FITCH.

Work of the Radium Commission.

THE first Annual Report of the work of the Radium Commission, published this time last year, gave an outline of the policy of the Commission, and stated that the radium was to be used primarily for the treatment of malignant disease. In the first instance, the faculties of medicine at universities throughout Great Britain, excluding Oxford and Cambridge, were approached, and negotiations with centres in London were made irrespective of the University.

The second Annual Report, just published,* shows that the year has been largely occupied in developing the work at the national radium centres. Since the Commission's scheme was launched, a number of medically qualified men have taken up radium therapy

and by courses of study in England and abroad have prepared themselves for the position of radium officers. The wisdom of the policy of concentration of radium therapy at centres where the work can be properly organised can scarcely be doubted, for it is becoming generally recognised that this is a highly specialised kind of treatment, and to carry it out satisfactorily there has to be a certain amount of co-ordination; pure medicine, surgery, radiology, pathology, and physics all play their parts. In these circumstances, it is obvious that the best treatment can only be procured where there is a real appreciation of the many factors that should decide and control the exact methods to be adopted.

It has been necessary to enlarge on the original scope of this radium service, for owing to the uneven

* Second Annual Report of the Radium Commission. Pp. 32. (London: H.M. Stationery Office, 1931.) 6d.