abstracts, or references. These tests indicated also the basic reasons for this imperfection, which are: (*a*) individual abstracting agencies concentrate upon the periodicals devoted to their special subjects, together with a few of those the fields of which are closely allied to these subjects, and thus they miss the articles on their special subjects which occur in other periodicals the scopes of which are less closely related to them; and (*b*) abstracting agencies often ignore books, pamphlets, separate reports and patent specifications.

(iii) The actual scattering of articles on a given subject throughout the mass of periodical literature was investigated. This scattering is the necessary consequence of the fact that every branch of science is related in some degree to every other branch of science, so that a periodical on any branch of science may contain, from time to time, a paper which is of interest from the point of view of any other science. The actual law of scattering has been deduced, both from theoretical consideration, and from investigation of the actual articles indexed on a given subject. This law shows that it is practically impossible for an abstracting agency, acting alone, to pick up more than about half the articles published on its special subject.

(iv) The actual occurrence of these scattered articles, in the estimated quantity, was proved by a bulk experiment with the collaboration of the abstractors of a large abstracting bureau.

These experiments show conclusively that, somehow, every useful article in every useful periodical must be dealt with as it appears. There are two different ways of accomplishing this task. Either we could create a new organisation to index, or to abstract, each useful article in each useful periodical, independently of the subject of the article; or the useful periodicals could be divided into groups, according to the subjects treated by existing abstracting agencies, and these agencies should undertake to pass on the articles not within their scopes to the agencies who should be interested in their subjects.

The former method would be utterly uneconomic, because it would duplicate, without any adequate reason, the work of the existing skilled and experienced abstracting bureaux. The latter method needs much less additional expense. No interference is involved with the internal machinery of any abstracting agency. Each can continue to deal with and abstract as many periodicals as it desires and to publish its abstracts in any format, provided only that it passes on the articles not within its own scope.

The application of this principle has been commenced in Great Britain. A committee of important abstracting agencies has been formed, which has accepted the principle, and an agreement has been made by two of the most important agencies, British Abstracts and Science Abstracts, to work together so far as possible in this way. Bibliography is unforgettably indebted to Dr. J. A. Wilcken, secretary of the British Committee, for his outstanding services in this work.

The comprehensive indexing of books and other separate publications is essentially a matter for librarians and can best be achieved by improving the accessions lists of the national libraries of each country. In this way we can certainly achieve complete documentation.

[This plan was adopted unanimously by the Council of the International Federation for Documentation, and a small international committee was appointed to promote it.]

SCIENCE MASTERS' ASSOCIATION

ANNUAL MEETING

THE forty-fourth annual meeting of the Science Masters' Association was held at the Imperial College of Science and Technology, London, during January 1–3; and once again, in spite of the fact that the previous meeting was held only last Easter, the attendance was large, and an excellent programme of lectures and visits to works marked another successful gathering. There was also the usual exhibition of books and apparatus by the leading publishers and manufacturers of scientific apparatus, and the customary exhibit of apparatus devised and constructed by members themselves, and also one of graphic material of use in teaching. The Association has now returned to its old practice of holding its annual meeting during the Christmas holiday.

Giving the presidential address, Lord Horder spoke on the "Place of Science in Teaching", approaching this in the free and interesting spirit of one who saw things in their wider setting, and presenting some sound advice to his audience. His address, which sparkled at times with some keen wit and was illustrated by apposite anecdote, took three aspects of the subject: the pupil, the matter taught, and the teacher. The most important aspect is the pupil, who is still, it must be emphasized, a child, still half-savage, with recurring moods of self-exhibitionism and fantasy which can last well into undergraduate life and which must neither be unduly encouraged nor neglected. The task of the teacher is to help the child on the road to the full development of personality; he cannot create such personality.

The matter taught must be free from domination by the examination spectre which stultifies curiosity and impairs receptive power, and must avoid undue emphasis on application at the expense of first principles. Through the study of science the youthful mind can acquire habits of clear thinking and direct expression which lead it to become a joy to itself and a source of benefit to others.

The attitude of the teacher is of fundamental importance to the efficiency of his teaching. This attitude must be animated by two ideals: first, that science must be free and self-contained, owing subservience to neither Church, State nor the pressure of economic adjustment; secondly, the discoveries of science must be used for the benefit of humanity. The present troubles of the world are due to too little science, not too much. To drive science underground by the cessation of research would be to repeat all the evils of the Dark Ages. What is important is that we retain sufficient control to drive the machine and not allow it to drive us. Upon these ideals it is important that science teachers should stand firm. The chief aim of science is truth, and truth grows as does a living plant, which suffers as much from forcing as it does from neglect.

The Association was again fortunate in having lectures from men of science of eminence in their own fields. Mr. E. J. Bowen spoke on "Elementary Wave-Mechanics", presenting a treatment which opened the way to deriving ideas of great value in chemistry teaching; Sir Edward Salisbury discussed "The Changing Flora of Britain", describing the nature of large-scale changes since the Glacial period; Sir George Thomson spoke on "Atomic Energy in Peace and War", ending with a stimulating consideration of present problems; Prof. J. Z. Young took the

subject of "Use, Effort and the Powers of Life", and dealt with the problem of treating in biology the self-preserving powers of organisms; and Dr. G. A. Jones discussed "High Speed Cinematography", accompanying his lecture with demonstrations of modern devices used to synchronize flash and exposure.

At the business meeting of the Association it was announced that the Association had been invited to hold its next annual meeting at the University of Sheffield. Prof. Irvine Masson, vice-chancellor of the University of Sheffield, has consented to serve as president for this year. Prof. E. N. da C. Andrade, last year's president, was elected an honorary member according to custom, and this tribute was also paid to the work for the Association of Mr. F. Fairbrother, the retiring membership secretary. Mr. H. F. Broad (Leighton Buzzard) was elected membership secretary in succession to Mr. Fairbrother; and in succession to Mr. A. E. E. McKenzie (chairman) and Mr. E. Lucas, who retired from the Committee, the meeting elected Mr. J. Lambert (King Edward School, Birmingham) and Mr. H. Jennings (Liverpool College). Mr. E. H. Coulson was re-elected treasurer.

A. E. BELL

FORTHCOMING EVENTS

*(Meetings marked with an asterisk * are open to the public)*

Monday, January 20

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY (in the Reynolds Hall, College of Technology, Manchester), at 5.30 p.m.—Prof. J. M. Meek: "Lightning and Spark Discharges".*

ROYAL ANTHROPOLOGICAL INSTITUTE (joint meeting with the ROYAL GEOGRAPHICAL SOCIETY, at Kensington Gore, London, S.W.7), at 5.30 p.m.—"The Ashanti Social Survey, 1945–46".

KING'S COLLEGE, Strand, London, W.C.2, at 6 p.m.—Prof. S. J. Davies: "Gas Turbines and their Prospects" (Lecture on behalf of the Institute of Marine Engineers).*

Tuesday, January 21

SOCIETY OF CHEMICAL INDUSTRY, AGRICULTURE GROUP (in the Physical Chemistry Lecture Theatre, Royal College of Science, South Kensington, London, S.W.7), at 2.30 p.m.—Dr. F. H. Malpress: "The Use of Hormones in Animal Husbandry".

SOCIETY OF DYERS AND COLOURISTS, LEEDS JUNIOR BRANCH (in the Colour Chemistry and Dyeing Department, The University, Leeds), at 4 p.m.—Dr. F. H. S. Curd: "The Chemotherapy of Malaria".

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 5.15 p.m.—Dr. C. D. Darlington, F.R.S.: "The Physiology of Chromosomes". (Subsequent lectures on January 28 and February 4.)

EUGENICS SOCIETY (at the Royal Society, Burlington House, Piccadilly, London, W.1), at 5.30 p.m.—Symposium on "Relation of Intelligence to Fertility" (Speakers: Sir Alexander Carr Saunders, Sir Cyril Burt and Dr. J. H. Fraser Roberts).

INSTITUTION OF ELECTRICAL ENGINEERS, RADIO SECTION (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Discussion on "Radio versus Line for Communication Systems" (to be opened by Mr. A. H. Mumford).

SHEFFIELD METALLURGICAL ASSOCIATION (at 198 West Street, Sheffield), at 6.30 p.m.—Annual General Meeting.

SOCIETY OF DYERS AND COLOURISTS, HUDDERSFIELD SECTION (at Field's Café, Huddersfield), at 7.30 p.m.—Dr. T. Richardson and Mr. E. R. Wiltshire: "The Package Dyeing of Cotton by the Pigment Method".

INSTITUTE OF PHYSICS, SCOTTISH BRANCH (at the University, Edinburgh).—Prof. P. I. Dee, F.R.S.: "Photography of Atomic Tracks".

Wednesday, January 22

INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS (at Faraday Building, 9th Floor, South Block, Knightrider Street, London, E.C.4), at 5 p.m.—Mr. A. Hudson, Mr. E. A. Smith and Mr. F. S. Hyatt: "Auto. Exchange Maintenance".

PHYSICAL SOCIETY, LOW-TEMPERATURE GROUP (at the Science Museum, Exhibition Road, London, S.W.7), at 5 p.m.—Dr. M. Ruhemann: "The Separation of Oil Gases".

ROYAL METEOROLOGICAL SOCIETY (at 49 Cromwell Road, London, S.W.7), at 5 p.m.—Annual General Meeting; Mr. G. Manley: "The Geographer's Contribution to Meteorology".

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 5 p.m.—Sir Claude Gibb: "Gas Turbines".

INSTITUTION OF ELECTRICAL ENGINEERS (joint meeting of the TRANSMISSION AND MEASUREMENTS SECTIONS, at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Discussion on "Switchgear Alarms and Indications" (to be opened by Mr. T. S. Andrew and Mr. T. R. Reyner).

SOCIETY OF DYERS AND COLOURISTS, MIDLANDS SECTION (at the Victoria Hotel, Nottingham), at 7 p.m.—Mr. C. S. Turner: "Shortcomings of the Dyeing Industry as seen by the Launderer, Dry-cleaner and Garment Dyer".

Thursday, January 23

CHEMICAL SOCIETY, LIVERPOOL SECTION (in the Chemistry Lecture Theatre, The University, Liverpool), at 5 p.m.—Prof. H. A. Krebs: "Metabolic Cycles".

LINNEAN SOCIETY OF LONDON (at Burlington House, Piccadilly, London, W.1), at 5 p.m.—Major Gavin Maxwell; "The Basking Shark (*Cetorhinus maximus*) of the Hebrides"; Dr. Hans Grüneberg: "The Significance of Coat Colour in Mammals".

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 5.15 p.m.—Prof. H. W. Melville, F.R.S.: "The Chemistry of High Polymers". (Subsequent lectures on January 30 and February 6.)

ROYAL STATISTICAL SOCIETY (at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1), at 5.15 p.m.—Discussion on "Statistics and the Statistician in Industry" (to be opened by Mr. H. T. Weeks).

INSTITUTION OF ELECTRICAL ENGINEERS, INSTALLATIONS SECTION (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Mr. V. J. Francis and Mr. W. R. Stevens: "The High-Pressure Mercury-Vapour Discharge and its Applications".

CHEMICAL SOCIETY, SOUTH WALES SECTION (joint meeting with the UNIVERSITY COLLEGE OF SWANSEA CHEMICAL SOCIETY, in the Chemistry Lecture Theatre, University College, Swansea), at 6 p.m.—Mr. E. J. Bowen, F.R.S.: "The Absorption of Light".

ROYAL INSTITUTE OF CHEMISTRY, MANCHESTER SECTION (at the Engineers' Club, Albert Square, Manchester), at 7 p.m.—Prof. T. P. Hilditch, F.R.S.: "Fat Shortages and Fat Substitutes".

CHEMICAL SOCIETY, SOCIETY OF CHEMICAL INDUSTRY and ROYAL INSTITUTE OF CHEMISTRY, EDINBURGH AND EAST OF SCOTLAND SECTIONS (at the North British Station Hotel, Edinburgh), at 7.30 p.m.—Mr. F. A. Scholefield: "Edmund Knecht" (Society of Chemical Industry Jubilee Memorial Lecture).

Friday, January 24

ROYAL ASTRONOMICAL SOCIETY (at Burlington House, Piccadilly, London, W.1), at 4.30 p.m.—Geophysical Discussion on "Atmospheric Oscillations" (to be opened by Prof. S. Chapman, F.R.S.).

INSTITUTION OF ELECTRICAL ENGINEERS, MEASUREMENTS SECTION (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Mr. H. Cobden Turner and Mr. G. M. Tomlin: "The Application of Electrical Technique to the Service of some other Industries".

INSTITUTION OF MECHANICAL ENGINEERS (at Storey's Gate, St. James's Park, London, S.W.1), at 5.30 p.m.—Dr. F. T. Barwell and Mr. J. C. W. Humphrey: "Materials New to Engineering".

SOCIETY OF DYERS AND COLOURISTS, SCOTTISH SECTION (at St. Enoch Hotel, Glasgow), at 7 p.m.—Mr. G. G. Simpson: "The Selection of Dyes for Covering Faded Garments".

CHEMICAL SOCIETY, ABERDEEN SECTION (in the Chemistry Department, Marischal College, Aberdeen), at 7.30 p.m.—Dr. D. P. Cuthbertson: "Recent Advances in our Knowledge of the Metabolism of Proteins and Amino Acids".

Saturday, January 25

BIOCHEMICAL SOCIETY (at the British Postgraduate Medical School, Ducane Road, London, W.12), at 11 a.m.—Scientific Papers and Demonstrations.

BRITISH SOUND RECORDING ASSOCIATION (at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2), at 4.15 p.m.—Conference on "Sound Recording".

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

GRADUATE FIELD RESEARCH WORKERS to investigate problems connected with the growth of forest trees in relation to soil and site factors—The Director, Imperial Forestry Institute, The University, Oxford (January 25).

LECTURER IN THE DEPARTMENT OF MECHANICAL ENGINEERING—The Principal, Birmingham Central Technical College, Suffolk Street, Birmingham (January 25).

LECTURER IN CHEMISTRY, and a LECTURER to teach ELECTRICAL and/or CIVIL and MECHANICAL ENGINEERING, in the Plymouth and Devonport Technical College—The Director of Education, Cobourg Street, Plymouth (January 25).

ASSISTANT TEACHER to be responsible for Agricultural Science, Animal and Soil Husbandry—The Chief Education Officer, County Offices, Aylesbury, Bucks. (January 29).

LECTURER IN MECHANICAL AND ELECTRICAL ENGINEERING in the Mining Department of the Denbighshire Technical College, Wrexham—The Director of Education, Education Offices, Ruthin (January 31).

ASSISTANT MASTERS in H.M. Dockyard Schools—The Director, Education Department, Admiralty, London, S.W.1 (January 31).

TECHNICIAN for research laboratory workshop—The Secretary, Barnato Joel Laboratories, Middlesex Hospital, London, W.1 (February 1).