paper covers: the present uncovered slide has now been used exclusively for upwards of fifty years.

Finally, among the exhibits was a small electron microscope shown by Mr. R. H. Horne.

The third session, a paper on cinemicrography, was given by Mr. R. McV. Weston. He discussed the apparatus and general technique of filming through the microscope and the difficulties that arise when cinecamera and microscope are harnessed together, mentioning vibration, weight, size of film and apparent changes of speed with magnification. He showed lantern slides of a number of famous pieces of apparatus and finished with a fascinating film he had made, the only one so far to have been taken at 3,000 exposures per sec. through the compound microscope: it showed what happened to the mercury at the constriction in a clinical thermometer immersed in warm water. MARY DEMPSEY

# BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION

## OPEN DAYS

DURING the week beginning March 23 the British Non-Ferrous Metals Research Association held open days during which representatives of members and other industrial companies, university staffs and government scientific workers were invited to visit the laboratories at Euston Street, London, N.W.1. A total of more than eight hundred persons went during the week, and, at a press conference held on the first day, some fifty newspapers and periodicals were represented. The equipment of the laboratories was demonstrated, and the Association's present researches with some of those recently concluded were illustrated by exhibits.

The work of the Association covers every aspect of metallurgy, including extraction, melting and casting, working, mechanical and physical testing, corrosion, analysis and metal finishing. Major research projects, of which there are forty-two in hand at the moment, are selected from those problems which are of interest to groups of the Association's members and which can be more satisfactorily handled on a co-operative basis than in an individual works laboratory. Members co-operate with the Association's staff, which exceeds one hundred and fifty in number, by making available through a number of advisory committees knowledge within the industry on the problem in question; in some cases, members carry out in their own laboratories specific items in a research for which they have special facilities and try out some of the Association's investigations on a production scale for the benefit of other members.

The exhibits at the open days naturally referred mainly to the work actually carried out in the laboratories in Euston Street and were too numerous for comprehensive description. The following notes select a few items for special mention.

*Pressing of aluminium alloys.* One of the difficulties in the production of sheet-metal pressings in the aluminium–magnesium alloys, which are otherwise the most suitable for this purpose, is the appearance of markings in the less severely worked parts of the sheet due to uneven yielding. These are called stretcher/strain markings and are similar in appearance to those occurring in steels. The true nature of these markings has been investigated and the causes of their formation ascertained in the laboratories. From this basic knowledge practical recommendations for their avoidance have been made, and the effectiveness of the measures suggested has been established by works trials carried out with the collaboration of several members. The industry is now in a position to supply aluminium–magnesium alloy sheets which are not liable to these markings.

*Improvements in bronze foundry practice.* Over many years the Association's work in this field has established the principles governing the avoidance of gas and shrinkage unsoundness, and the present work is largely concerned with the application of this knowledge in industrial production. A special investigation is also being made in the use of insulated feeder-heads which not only improve the feeding of a casting but also greatly reduce both the weight of metal melted for a good casting and the labour involved in fettling.

*Titanium.* Although some exaggerated statements have been made about titanium, there is no doubt that its remarkable strength and corrosion resistance, coupled with its relatively light weight (intermediate between aluminium and steel), make it an extremely promising material for many engineering applications. The present high cost restricts very much its potential uses, but the prospects for the future are such as to make it important for Great Britain to play its share in the development of titanium alloys. The Association has investigations in this field in hand on behalf of the Ministry of Supply, and is provided with special equipment and experience in the techniques necessary for the handling of this highly reactive element.

*Prevention of corrosion.* Many of the applications of non-ferrous metals in engineering practice depend on their intrinsically high corrosion resistance, and the urge to develop better materials for particular applications is very pressing. In the field of condenser-tube alloys, the Association is pre-eminent. Aluminium brass, which is now very widely used in marine and land installations, was developed in the Association's laboratories, and the beneficial effect of iron additions in the 70/30 cupro-nickel alloy, which is widely accepted as the best all-round material for marine use, was fully established by the Association's work. This was followed by the development of copper–nickel–iron alloys of low nickel content, which are easily worked by the coppersmith and are resistant to corrosion by moving sea-water.

Similar work has been carried out on materials for the conveyance of fresh waters. For example, the occasional pitting to which copper water-pipes are subject has been traced in part to a film of carbon formed during the annealing operation which, when recognized, can easily be avoided, and in part to the absence from some waters of a naturally occurring corrosion inhibitor. Attempts are at present in hand to isolate and identify this inhibitor.

*Metal economy.* Researches designed to improve the efficiency of the manufacturing operations or to lengthen the service life in a particular application all promote the economical use of metals, and most of the Association's work comes in this category. Some researches have, however, been specifically aimed at problems in this field, such as the recovery of copper from pickle liquors, reduced consumption of zinc in galvanizing and more effective use of nickel in electroplating.

*Metal finishing.* One of the main investigations in the relatively newly formed Metal Finishing Laboratory at Euston Street is on the use of nickel in electroplating. Other researches in that field, designed to improve technique, are those on the electroplating of aluminium and on chromium deposition. The plating of aluminium is difficult, due to a tendency of the basis metal to form a film which prevents proper adhesion of the deposit. This is overcome by the initial formation of a thin zinc coating in one of two ways: chemical replacement, or electrodeposition. The conditions necessary to secure the optimum results in both these methods have been worked out, with marked improvement in industrial practice as a result.

*Analysis.* In the analytical field, the Association is responsible, apart from a vast amount of analysis required in its own investigations, for the development of new methods and apparatus. The exhibits during the open days covered an extremely wide variety of analytical methods, including the determination of gases in metals. In the chemical field great use is made of the polarograph (including derivative polarography) and of the spectrophotometer. In the field of spectrographic analysis, the Association has been responsible for a great deal of work aimed at improving the range and accuracy of the method. A direct-reading spectrograph (Quantometer) has recently been acquired, designed for the examination of copper alloys. The accuracy and field of use of this instrument are being explored in the light of its known success in the aluminium and steel industries.

## DEODAR AS PENCIL WOOD

UNTIL recently the so-called East African cedar (*Juniperus procera*) from Kenya has held sway in Britain, the United States and elsewhere as providing the highest class of pencil. Formerly the eastern red cedar of America (*Juniperus virginiana*) was widely used for pencil-making in the United States; but supplies gave out and the Kenya cedar held pride of place for the best-class and highest-priced pencil. Another tree used for this purpose in the United States is the incense cedar (*Libocedrus decurrens*), which grows in California. The use of the beautiful Indian deodar wood (*Cedrus deodara*) for pencil slats is a new idea, due to the research work undertaken at the Research Institute at Dehra Dun, and Indian Forest Bulletin No. 149 (New Series) gives a brief account of this new application*. The deodar has been extensively used in the past for other purposes: after the Sikh Wars in the Punjab (1849), the province was taken over and the British made acquaintance with the deodar, practically the only wood used by the local people, in the building of stations and cantonments; later, in the early 1860's, with the coming of the railways, the wood was in even greater demand for making sleepers.

The habitat of the deodar is the north-west Himalaya at approximately 6,500–8,000 ft. It has a strong timber, of good grain and easy to work, and is free from warpage. The trees are felled on contracts by the mountain people, converted *in situ* as required for logs or sleepers and floated down the mountain rivers to the part of the hills where they are collected in depots and built into rafts for the rest of the journey. The forests and work are mostly under the supervision of the government forest department. From the work done at the Institute, it is claimed that the wood makes first-class pencils. Unfortunately, its colour is light yellow; it is thought the public would be suspicious of the unusual colour, so the deodar slats are stained with a dye to a more popular colour. If the deodar pencil can be put on the market at a paying price, the results should be satisfactory, for the consumption in India to-day is about half a million gross of pencils, of which the deodar will supply the demand for higher quality pencils and save imports.

In supplies of material it is hoped to make use of part of the millions of cubic feet of sawn timber extracted every year as shipur; but perhaps more particularly to exploit the huge amount of off-cuts and small pieces left in the forest after the shipur conversion. The bulletin is silent as to the methods by which this material can be collected on the mountain-side in forests where chain-felling is not practical, and it also gives no indication as to the costs of such collection.

* Indian Forest Bulletin (New Series). No. 149 (Wood Seasoning): Deodar as Pencil Wood. By M. A. Rehman and Jai Kishen. Pp. iv + 7. (Delhi: Manager of Publications, 1951.) 5 annas; 6*d*.

## EARTHQUAKES DURING 1952

DURING 1952 there were eighty-nine earthquakes each having a magnitude 6 or greater than 6 on the Richter logarithmic scale. The greatest two had magnitudes $8\frac{1}{4}$ and about $8\frac{1}{3}$, these being rather less than the greatest the world has known. One of the two occurred on March 4 from an epicentre near the east coast of Hokkaido, Japan. Fissures in the earth were caused, and a section of the cliff sank into the sea. Several bridges were damaged, railway lines were buckled and two trains were derailed. When buildings collapsed, fires were started. There was probably some geological fault displacement in the sea-bed also, as a tsunami with waves up to eight feet high swept the coast and swamped a fishing fleet of twenty boats at Uzumai village. At least 31 people were killed and 169 injured, and there was extensive damage to property.

The other earthquake occurred on November 4 from an epicentre near the east coast of Kamchatka (see *Nature*, 170, 914; 1952). The epicentre, as calculated from observations at eighty-one observatories by the workers at the International Seismological Association Central Station at Strasbourg, was situated at lat. 52·9° N., long. 160·1° E., and the initial time was 10 hr. 58 min. 23 sec. G.M.T. The macroseismic effects in Kamchatka are not yet known, but the earthquake started a great tsunami which spread across the Pacific Ocean and reached as far as the shores of New Zealand, the Hawaiian Islands and South America.

During the past year five earthquakes were reported with a focal depth equal to, or greater than, 400 km., the one with the greatest focal depth (700 km.) being on February 11 with its epicentre in the Java Sea.

There were a number of earthquakes in or near Europe, and these included the following. On January 3 an earthquake occurred with epicentre near Hasankale in Turkey, Erzurum being affected; the shock caused damage to some 1,570 houses, and at least 94 persons were killed and 262 injured. On February 7 an earthquake at Arette in the Low Pyrenees, and on February 24 another near Worms