The Wellcome Historical Medical Museum.

BY invitation of Mr. Henry S. Wellcome, a conversazione and meeting of the Royal Anthropological Institute was held at the Wellcome Historical Medical Museum on the evening of May 24. A number of members of the Prehistoric Society of East Anglia, which had held a London meeting at the Royal Anthropological Institute that afternoon, was also present. A cordial message of greeting had been cabled by Mr. Wellcome, who is at present in America, and at his request the guests were received on his behalf by Mr. H. J. E. Peake, president of the Institute, and Mrs. Peake.

A short address on the character and contents of the museum in its anthropological aspect was delivered by Prof. Elliot Smith. Prof. Elliot Smith said that the great museum that Mr. Henry S. Wellcome has created is unique. It affords a concrete demonstration of the history of man's attempts to cope with the fundamental problems of life and death. If such a collection is of interest to physicians and surgeons, it is of vital importance to anthropologists, because it deals with that particular aspect of the study of mankind which is now for the first time coming to be recognised as the central aim of all humanistic inquiry. It illuminates the motives for customs and beliefs, and provides the material for interpreting what is involved in the idea of progress; but it also suggests the explanation of superstition and intolerance.

The fundamental attribute of all living creatures is the fact that they are alive; and their essential reactions serve the purpose of preserving the life that is their distinctive property. In man these instinctive processes receive articulate expression, and to the unconscious reactions for self-preservation are added innumerable devices that are deliberately invented as rational means of preserving and adding to the vital substance. In the Wellcome Museum is displayed a vast collection of charms, amulets, and elixirs of life that have been used by people of every race and clime, and of every time from the upper palæolithic to twentieth-century London, for the purpose of self-protection. As the originally rational excuse for the efficacy of most of these givers of life was shown to be unfounded, many of them still survived in popular estimation, but being stripped of any justification for their reputation, they fall into the category of magic.

Another aspect of essentially the same process is displayed in the practice of mummy-making, the use of relics and magic bundles, and the initiation of medicine-men. Ancient literatures contain accurate reports of the real beliefs of the people of antiquity —that the processes of mummifying the body or making an image of a king conferred upon him a new existence and a new and divine personality, which enhances his powers of conferring safety and prosperity upon every individual among his subjects. The pretence of mummification is the essence of the initiation of a medicine-man, giving him a new name and new powers of life and death; and the symbol of his powers is the magic bundle, which is either the actual mummy or the pretended relic of his predecessor. In the Wellcome Museum are the mummies, the mummified heads, the magic bundles, the graven images, the standards, and the dress of the medicine-men, the amulets, the elixirs of life, the equipment of the astrologers and alchemists, that afford concrete demonstrations of the reality of these things.

The wonderful reproductions in the museum of a chronological series of pharmacies provide a dramatic demonstration of the historical links between the magic of the past and the science of to-day.

Important as the collections of the Wellcome Historical Medical Museum are as an objective record of the history of medicine and the associated sciences, its great value lies in the fact that it affords a demonstration of (and an instrument of research into) the universal problems of human aspirations, and that Mr. Wellcome had this wider vision of its meaning is shown by the fact that he has placed an anthropologist in charge of the Museum.

A vote of thanks to Mr. Wellcome was moved by Lord Onslow and seconded by Dr. Spencer, president of the History of Medicine Section of the Royal Society of Medicine. In putting the vote to the meeting, Mr. Peake emphasised Mr. Wellcome's services to humanity, of which the Museum represented part only. He referred to his work for tropical medicine, especially at Khartoum, and his support of archæological exploration. Starting as a history of medicine, the Museum is becoming more and more anthropological in outlook. He referred also to Mr. Wellcome's judgment, in view of this aspect of the Museum, in selecting Mr. Malcolm, a trained anthropologist, as the conservator of the Museum. In replying on behalf of Mr. Wellcome, Mr. Malcolm emphasised the desire of its founder that it should develop as a Museum devoted to research.

The Production of Pure Chromium, Manganese, and Silicon.

IN connexion with the researches on the alloys of iron at present being carried on at the National Physical Laboratory, accounts are given by F. Adcock, Dr. M. L. V. Gayler, and N. P. Tucker in a paper read recently before the Iron and Steel Institute, of the successful attempt to produce three steel-making elements in a state of high purity. It is of interest that each element is prepared by an entirely different type of process. Chromium is made electrolytically, manganese is produced by distillation, and silicon by purely chemical purification.

The chromium was prepared by the electrolysis of an aqueous solution containing 30 per cent. of pure chromic acid and 1 per cent. of sulphuric acid. Lead anodes were used with tin or steel cathodes. Three types of apparatus are described, for one of which, with a steel cathode rotating at a rate of 30 revolutions per minute, the following data are given: The temperature of the bath was 20° C., the voltage 5·2, with an amperage of 140. The current densities at the cathode and anode were 28 amp. and 7·2 amp. per sq. dm., and the yield of chromium in 30 hours was 500 grams, with a current consumption of 8·3 ampere-hours per gram.

All the samples as deposited contained hydrogen and oxygen, the former being liberated during remelting *in vacuo*. The oxygen, which in the cathode chromium is in a form which leaves no residue on solution in acid, is converted on vacuum heating into insoluble chromium oxide (Cr_2O_3). This can be removed, however, by heating the solid metal in pure, dry hydrogen to 1500°-1600° C. (The melting point of chromium is considerably above that of iron, but has not yet been accurately determined.) After these treatments, spectroscopic examination failed to reveal any impurities.

The great hardness of electrolytically deposited chromium, 600-650 Brinell, is apparently caused by the occluded hydrogen, the crystalline form, and possibly the oxygen. It is not possessed by metal of high purity melted or annealed at high temperatures in vacuum or hydrogen, the hardness being then so low as 70 on Brinell's scale.

Manganese of purity 99·3 per cent. may be prepared by the reduction of the oxide by aluminium if the purest available materials are used. Allmand and Campbell's process of production electrolytically from a neutral bath of ammonium and manganese sulphates is also capable of yielding small quantities of the pure metal. By distillation under a pressure of 1 mm.-2 mm. in a high frequency induction furnace at a temperature just above the melting point of the metal, manganese with total impurities less than 0·01 per cent. is readily obtained. The metal thus prepared is silver grey in colour and very brittle. On remelting *in vacuo* the ingot produced is extensively cracked, a phenomenon associated with the critical points which are observed on cooling from fusion. The metal is hard enough to scratch glass and very brittle. When exposed to air it does not tarnish as do ordinary samples of the metal.

The melting point of the manganese has been determined in an atmosphere of hydrogen and is given as 1244° ± 3° C. Four change points have been observed in the cooling curves at the following temperatures: 1191°, 1024°, 742°, and 682° C. The change at 742° C. appears from the micro-structure to be associated with a change of crystal structure, though no such effect is observed in connexion with that at 682° C. One or both of these changes is accompanied with a marked change of volume.

The method finally adopted for the production of silicon of high purity is as follows: The best available sample of commercial silicon is broken up as small as possible and just covered with water. Strong hydrochloric acid is then added in small quantities at a time, and after the action has quietened down a considerable amount of hydrochloric acid and some nitric acid, and the whole is digested for 24 hours. The impurities, consisting mainly of iron and aluminium silicates and the silicides of iron, calcium, and magnesium, are dissolved. After the necessary washing and filtering the residue is placed in a platinum dish, water added, which is followed by a considerable excess of strong sulphuric acid and small amounts of hydrofluoric acid in small quantities at a time. When all apparent action has ceased, the mixture is evaporated until it fumes. When cool it is digested with water for some hours, filtered and washed. It is again treated with strong hydrochloric acid for several hours, filtered, washed, and dried in a steam oven. The product under favourable conditions contains 99·94 per cent. of silicon and possesses a structure consisting entirely of extensively twinned crystals. F. C. T.

The San Andreas Rift.

IF it were only for its connexion with the Californian earthquake of 1906, the San Andreas rift would be one of the most interesting fault-systems known. The movements that were the cause of that earthquake took place in the northern half of the rift, from San Juan on the south, with three submarine interruptions, to near Cape Mendocino on the north, a total length of about 270 miles. The rift, however, is known to extend more than 300 miles south of San Juan, as far as the desert regions of southern California.

The earthquake of 1906 directed attention to our ignorance of the course of the rift in the latter regions, and, during the past six years, the detailed mapping of the San Andreas fault and the associated fault-zone, together known as the San Andreas rift, has been carried out by Dr. L. F. Noble, of the U.S. Geological Survey. His work is not yet finished, but a report by him of unusual interest on the results already attained is published in the "Year-Book of the Carnegie Institution of Washington" (No. 25, 1925–26, pp. 415-428).

The area studied by Dr. Noble is the southern portion of the rift along the south border of the Mohave Desert and extending across the San Gabriel Mountains into Cajon Pass. The rift here runs in a south-easterly direction and appears as a continuous chain of scarps, trough-like depressions, and ridges, all of which afford clear evidence of recent movements. So straight is the line of the rift that one can see along it for 25 miles or more. Bordering this profound master-fault is a belt of roughly parallel and interlacing fractures, in some places as much as six miles wide. The characteristic features of the rift often change abruptly along its strike. Within half a mile, a scarp may give place to a ridge and the ridge to a trough, or a scarp facing one way may die out and give place to a scarp facing in the opposite direction. The features differ much in size. Some depressions are mere trenches a few feet wide and one or two feet deep. Others are as much as one hundred feet in depth and many hundreds of feet wide. They are in all stages of modification by erosion, either still fresh or almost obliterated. As a rule, the older features are on a much larger scale than those of recent date, indicating that the earlier movements were of the greater magnitude. Some of the recent features point clearly to horizontal movements along the fault. For example, near Cajon Pass, four deep ravines that descend the steep slope of the San Bernandino Mountains on the east side of the rift are displaced abruptly at the fault-trace, each ravine appearing on the west side of the fault at a point at least 150 feet farther to the north-west.

The fault-zone bordering the great fault is a mosaic of elongated blocks, the longer axes of which are parallel to the strike of the fault. In many places the rock-masses are so shattered and different formations are so mixed together that it is impossible to map them. The dominant structure is a sort of slicing that appears to be mainly the result of horizontal shear along the San Andreas fault. Along some of the branching faults are narrow strips of steeply dipping Tertiary sediments pinched between much older crystalline rocks. One of these strips runs for a distance of twelve miles through the highest part of the San Gabriel Range, and in most places does not reach a hundred yards in width.

At but few places in the fault-zone are similar rocks to be found on both sides of the fault. In one portion fifty miles in length, the fault is bordered continuously on the south side by pre-Cambrian schists, while the rocks on the other side are Mesozoic granites and pre-Cambrian gneisses. No clearer evidence of the magnitude of the fault-displacements could be desired.

The first movement along the rift of which the date can be determined approximately occurred between late Mesozoic and early Quaternary times. The different stages of erosion exhibited by the recent, sub-recent, and older topographic features along the rift prove that faulting has taken place at intervals all through Quaternary time and that it has not yet come to an end. C. D.