

disturbance must have been considerable. At St. Mary Cray, there is no evidence of occupation, at least since Roman times. It is possible, therefore, that they may serve the needs of the archaeologist to better effect, and it may be, throw further light on the prehistoric excavators of the chalk, to whose activities the dene holes, notably near Croydon, bear witness. Exploration of the newly discovered caves will begin as soon as the subsided clay has been removed and the roof of one of the chambers has been supplied with the necessary shoring.

Modern Developments in Broadcasting

IN a paper read before the Institution of Civil Engineers on February 16, Sir Noel Ashbridge traced briefly the growth of broadcasting transmission and television, and referred to some of the recent developments arising from the researches carried out by the B.B.C. The paper dealt at some length with the design of studios and the effect of size, shape and materials upon their acoustic properties. The advantages of the ribbon microphone over its predecessors were referred to, and the principal methods of sound recording were described. Improvements in the design of transmitting stations are broadly covered by schemes for economizing the power required for producing a given radiation output, and by the use of high vertical aerials, which tend to concentrate the radiation in the horizontal plane so as to give the most efficient service area. Sir Noel remarked on the difficulty of accommodating all the European broadcasting stations within the available wave-length band, and described the expedient of sharing wave-lengths between two or more transmitting stations by synchronizing their carrier waves. Next, a reference was made to the Empire broadcasting service, and the reasons which necessitated the use of short waves for this purpose were outlined. As a result of research carried out on the design of short-wave aerials to give the most efficient radiation, a considerable improvement is to be expected in overseas reception when the new short-wave transmitters of the B.B.C. are brought into operation in the near future. The paper concluded with a brief description of the methods and technique being employed for the transmissions from the London Television Station on ultra-short waves. The results of field strength surveys round London were given, and reference was made to the effect of interference from motor-cars and electrical apparatus.

Ultra-Short Wave Broadcasting

THE broadcasting service from the Alexandra Palace television station has already illustrated the suitability of ultra-short waves as a medium for the transmission not only of high-definition pictures but also of speech and music of very high quality. The latter achievement arises from the fact that in the ultra-short wave-band, the permissible band width available for the modulation frequencies is many times that obtainable amidst the present congested conditions in the medium and long-wave broadcasting bands. It is rather natural to suggest, therefore, that

more use might be made of the ultra-short wave-lengths for high-fidelity sound broadcasting. This matter was referred to in a note in *The Times* of February 18, in which it was pointed out that this aspect has been under consideration by the B.B.C. for some time past. Indeed, experiments were carried out some years ago with a transmitter installed on the roof of Broadcasting House and operated on a wave-length of six metres. Further experiments are being conducted, but it is stated that no plans have yet been made for the development of a public service on these lines. A large-scale extension of the ultra-short wave broadcasting of sound would be complicated by at least two factors. First is the fact that the B.B.C. is not the only user of the band of wave-lengths below ten metres, for some other national services already have vested interests there. Secondly, there is the difficult problem of interference from the ignition systems of motor-cars, which cause very unpleasant noises in neighbouring receivers working on ultra-short waves. It would seem to be unlikely that broadcasting on these wave-lengths will become really popular until the fitting of suppression devices to such ignition systems is made compulsory.

Radio-Elements as Research Tools

IN a lecture to the Society of Chemical Industry on March 1, Prof. F. A. Paneth discussed "Radio-Elements in Chemical and Biological Research". Owing to the extreme sensitivity of electrometric methods it is possible to detect radio-elements in much smaller concentrations than any other chemical substances; and as they are isotopic with ordinary elements we can in many investigations substitute a radio-element for its inactive isotope. Such use of 'radio-elements' as indicators is frequently of great help if the behaviour of an element in very small concentration has to be investigated. Perhaps of even greater importance is a slightly different application. By mixing a fraction of a stable element with its radioactive isotope we can differentiate this fraction from the rest of the element, and then study the exchange of atoms of identical chemical properties. It is especially this use of 'indicated atoms' which opens the door to otherwise insoluble problems. Since the discovery of artificial radio-elements, almost every chemical element can be obtained in the form of its radioactive isotope, and the use of radio-elements as indicators has been greatly extended.

AMONG the problems to the solution of which radio-elements have contributed are the determination of the solubility of very slightly soluble compounds, the preparation of the volatile hydride of bismuth, the study of the permeability to air of almost completely airtight gas-mask fabrics, of the formation of alloys at low temperatures, the rate of solution of exceedingly thin films, and electro-deposition from extremely dilute solutions. With the help of 'indicated atoms' the diffusion of lead into lead, the determination of the surface of adsorbing crystalline powders, the exchange of atoms of one and the same kind in