

Already a large number of substances have been used as non-specific agents ; in many cases, of course, these remedies were employed long before any explanation of their action had been formulated on the above lines. Of the long list of agents given by Petersen only a few can be mentioned.

First comes counter-irritation by means of thermocautery, seton, blisters, etc. Each of these procedures has for object the production of a focus of inflammatory exudation, suppuration, or necrosis ; the absorption of the pathological exudates must lead to a tissue stimulation similar to that which follows more modern non-specific injections. Our non-specific therapy is thus but part and parcel of this older practice of counter-irritation.

Normal animal sera have been used,—horse, beef, goat, sheep, chicken, and other sera ; these were first injected subcutaneously, and in more recent years into a vein ; as much as 250 c.c. of beef serum have been given in anthrax without injury. Antibacterial sera and antitoxins have been widely used,—diphtheria and tetanus antitoxin, antistreptococcal, antipneumococcal, antidyseptic serum, etc. ;—as remedies, that is, not in the homologous diseases, but in other morbid conditions, e.g. diphtheria antitoxin against streptococcus infection, tuberculosis, lupus, etc. The numerous vaccines, prepared in the first place as specific agents,—typhoid, dysentery, streptococcal, pneumococcal, influenza vaccines,—have also been used with a non-specific object.

Various native proteins have been given,—solution of egg albumen and serum albumen injected subcutaneously, milk by intramuscular injection, casein, gelatin ; of protein split products, proteoses (albumoses) prepared from different proteins sometimes give a very prompt and satisfactory reaction. The enzyme treatment of cancer, exploited some years ago, consisted in the subcutaneous injection of a trypsin solution ; a general reaction,—chill, sweating, and rise of temperature,—followed the injection, and the patient would have several days of comparative comfort.

Colloidal metals constitute another group of remedies ; these are active catalytic agents, and it is supposed that they act therapeutically in virtue of this property as inorganic ferments ; they whip up the organism, which responds, if response is possible, by producing

more leucocytes. A number of colloidal metals have been prepared for therapeutic employment ; the colloidal silver preparations have been in use longest, but arsenic, zinc, gold, manganese, iron, mercury, and other metals, as well as sulphur and iodine, have been employed with varying success in septic conditions, endocarditis, rheumatism, trench fever, etc.

The use of light, Röntgen rays, and radium must also be mentioned. These agents first stimulate tissue cells, and later, with prolonged exposure, cause their death. In both cases substances enter the blood stream which produce a general reaction ; this may be mild, or accompanied by severe fever. After moderate reactions of this type, if the patient is in good condition and able to respond, improvement of appetite, nutrition, and general well-being may set in, just as after other non-specific agents. Here, then, we have at least a partial explanation of the effect of heliotherapy in tuberculosis, as used, for example, at Leysin in Switzerland, of which the public has heard much in the last few months.

About half of Dr. Petersen's book is occupied with an account of the methods used and the results obtained in the numerous diseases for which non-specific therapy has been tried. The last chapter, on indications and contra-indications, gives much useful advice. We are reminded that the method can only be applied intelligently if we recognise that by it all the forces of cellular and humoral resistance are for a short period of time keyed to the highest pitch ; stimulation of this kind is useless when the cells of the body are profoundly fatigued, and hence injections must be given early in the course of the disease. But "the non-specific method of treatment should under no circumstances be considered as a rival or a substitute for the proven specific measures that we have at our command. That a non-specific factor is at times and possibly often associated with the specific reaction may be true, the more reason that both should be studied and both utilised in their proper time and place."

The bibliography runs to no less than fifty pages, and must, one would think, be complete up to date. The book as a whole forms an interesting, convenient, and comprehensive account of a recent development of medical thought and practice.

### The Solvay Institute of Chemistry.

THE first meeting of the "Institut International de Chimie Solvay" was held in Brussels on April 20-27, under the presidency of Sir William Pope. It will be remembered that before the war M. Ernest Solvay set aside a capital sum to be expended in the course of thirty years by the International Institute of Physics, and that meetings under the auspices of this Institute have been held in Brussels both before and since the war. More recently M. Solvay has set aside a further capital sum of one million francs, also to be expended in thirty years, for the promotion of the science of chemistry.

The meetings of the Institute are attended by delegates from different countries, the number being limited to about thirty, so that the discussions may be as

free and as informal as possible. The recent meeting was devoted to the consideration of a number of those questions which affect the foundations of modern chemistry, and its programme included the presentation of papers on isotopes, by Soddy, by Aston, and by Perrin and Urbain ; on X-ray analysis and molecular structure, by W. H. Bragg ; on the electronic theory of valency, by Mauguin ; on optical activity, by Pope and by Lowry ; and on chemical mobility, by Job.

In connection with the papers on isotopes, considerable discussion was aroused as to the possibility of two dissimilar arrangements of planetary electrons around the same type of nucleus. The possibility of such an isomerism in the external domain of the atom was conceded, although at present only as a hypothesis ;

but, in view of the fact that radiation by the atom is attributed to the movement of electrons from one orbit to another, the prospect of realising two different stable configurations of the orbits appears somewhat remote. Another possibility, that atoms may exist of equal atomic weight as well as of equal atomic number, has been discussed in connection with certain members of the radium and actinium series or radio-elements. The supposed necessity for recognising this subtle type of distinction between atoms is based on the assumption that radium and actinium are derived from a common parent and that all the members of both series of radio-elements must therefore have atomic weights of the type  $(238 - 4n)$ . If, however, radium and actinium are derived from isotopic forms of uranium, the two series of radio-elements may well prove to differ in atomic weight, *e.g.* by one unit. The discussion on Aston's paper dealt largely with the question of how an "element" should be defined, in view of the discovery of isotopes not only amongst radio-elements but also amongst the common elements. Aston appeared to voice the feeling amongst physicists by suggesting that each atomic number should represent one element; but he was opposed by a number of chemists, who argued that the word "element" carried with it an idea of homogeneity which could not be reconciled with the proposal to describe as an element a mixture of isotopes, the separation of which might at any time become a practical possibility. The paper on the separation of isotopes, presented by Perrin and Urbain, was to have been prepared by the late Prof. Guye. It certainly served to emphasise the extreme difficulty of the separation, since nearly all the methods derived from analogy with rare earths or isomeric hydrocarbons have been shown, both by theory and by experiment, to be impracticable.

Bragg's demonstration of recent results obtained by the X-ray analysis of crystals was greatly aided by models, which could be not only viewed at close quarters, but handled and studied during the whole period of the conference. Some discussion arose in connection with his demonstration of the relationship between the crystal structure of diamond and of graphite, and of the two kinds of relationship between carbon atoms which are shown by the model of graphite. Two different kinds of linkage were also shown between atoms of bismuth, corresponding perhaps to co-valence and electro-valence respectively. The principal subject of discussion arose, however, from the application

of X-ray analysis to organic compounds and a bewildering array of chemical problems was suggested, in connection with which X-ray analysis might lead to useful results. A modification of Barlow and Pope's theory of crystal structure, in which a quadrivalent atom is represented by an aggregate of four unit spheres, was described, and shown to present many points of close agreement with the crystalline structure actually recorded in organic compounds.

The discussion on the electronic theory of valency which followed Mauguin's paper included perhaps a larger proportion of adverse criticism than is usually accorded to it. In particular, the lack of any adequate explanation of variable valency, and the indeterminate character of the valency equations (which do not admit of a unique mathematical solution) were the subjects of much comment.

The discussion on optical activity dealt mainly with the usefulness or otherwise of retaining the idea of the asymmetric carbon atom. It was agreed that the asymmetry of the molecule was the only thing that mattered; but expression was given to the view that the term was of value as enabling the organic chemist to recognise at once the existence of many cases of molecular asymmetry, although this might still be looked for in many cases where no asymmetric atom was present. In the discussion on rotatory dispersion the idea was expressed that liquid media which gave rise to complex dispersion-curves might be suspected of containing more than one type of optically-active molecule; in the case of coloured compounds, however, a looped curve might result from the presence of an absorption band in the region under investigation.

The discussion on chemical mobility was for the most part focussed on the radiation theory of chemical action. The lack of agreement between the predictions of the theory, and the results obtained in seeking to verify it, was emphasised. Thus, the observed temperature coefficient of the thermal dissociation of phosphine leads to the conclusion that an absorption band should appear in the violet region of the spectrum. No such band is found, and the theory has therefore been modified in a way which suggests that the active radiations may be found at lower frequencies, *e.g.* in the infra-red region of the spectrum. Actually, however, the change is very sensitive to ultra-violet radiations, and a further modification of the theory would be needed to account for this persistent deviation from the experimental facts.

### Universal Wireless Telephony.

IN view of the great technical progress that has been made during the last few years in the development of the wireless telephone, and the attention that has been given by the Postmaster-General to the framing of regulations for its orderly use in this country, a considerable popularisation of wireless telephony appears imminent. It is therefore of some interest to examine briefly the facilities as well as the limitations which exist regarding its use. It is obvious that anything like secrecy in conversation over the radio-telephone, as it is now often called, is out of the question, as any one in possession of a half-

guinea licence and a receiving set, which can be tuned to the wave-length employed, can "listen in" and pick up the message irrespective of the station for which it was primarily intended. On account of the publicity which thus attends the utterances of the wireless telephone, its field, except in such special cases as aeroplane work, is practically limited to the dissemination of public information, news, music, and other entertainment items, or as it is now commonly called, "broadcasting." Unless, however, these broadcasting stations are rigorously controlled, they will not only defeat their own ends by drowning each