

different countries of the world, their bioclimatic zones could be predicted and mapped (so far as maps of topographic surveys are available), as has been demonstrated by a detail map of the bioclimatic zones of the United States and preliminary maps of the thermal zones of the British Isles, Germany, and Australia.

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#### Organisation in Chemical Societies.

As one who has some direct knowledge of the affairs of the Chemical Society, I should like to reply to the letter from Dr. M. W. Travers which appeared in NATURE of October 4. Dr. Travers has presented a singularly one-sided statement of the position, for in his endeavour to prove that the societies give an inadequate return for the subscriptions received, he omits essential points which any fair-minded man would take into consideration before giving a verdict on that charge.

In the first place, Dr. Travers criticises adversely the decision to make an extra charge for the Chemical Society's "Annual Reports," since, in his view, students, to whom this publication particularly appeals, will be thereby discouraged from joining the Society. He omits to mention, what is equally relevant, that, for the present, new fellows are not required to pay the entrance fee of 3*l.*—a financial alleviation which has been introduced mainly to meet the case of the young chemist, and ought in fairness to be set against the new charge for the "Annual Reports." The necessity of paying 3*l.* in addition to the first annual subscription has, quite naturally, prevented many students and junior chemists from joining the Society.

Then the Chemical Society's Library, with the upkeep and development of which all the leading chemical organisations are now associated, is put out of count by Dr. Travers, because it is not "in any way comparable with the Patent Office Library." Against this unwarranted and contemptuous reference to the Library of the Chemical Society I should like to put the plain fact that, since the opportunities for using the Library were extended some years ago, the annual number of readers has increased from between two and three thousand to between six and seven thousand, and is rising steadily. Further, the Patent Office Library, however useful to Londoners, cannot serve chemists who reside in the provinces, whereas a large proportion of the books and journals in the Chemical Society Library can be borrowed, either directly or through the post. The extent of the availability of the Chemical Society Library is not generally realised.

As to abstracts, it is, of course, well known that the American publication covers a much wider area than the two sections of the British abstracts combined, but that is not necessarily an unmixed advantage. Against the narrower scope of the British publications, however, it is only right to set the fact that abstracts appear there more promptly than in *Chemical Abstracts*. Some papers, more particularly those from American sources, are reported earlier in *Chemical Abstracts*, but the majority are abstracted first in the British publications. The more prompt appearance of the British abstracts is a valuable feature which deserves to be emphasised.

Those who give time and thought to the affairs of the chemical societies have, I believe, no objection to candid criticism, provided it is just. In connexion with abstracts, for example, the desirability of improvement and co-ordination is recognised, and I would invite Dr. Travers (and any other critics) to submit to us any really *constructive* suggestions, not

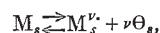
in the spirit of his letter, but in the spirit of co-operation. As chairman of the Bureau of Abstracts, I guarantee that any such practical suggestions will receive fair consideration.

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#### Transformations of Elements.

THE theory of allotropy, starting from the supposition that every state of aggregation (phase) of a so-called simple substance (system of one component) is complex, that is, consists of different molecular species, and stating that behaviour as a simple substance is only due to the rapid establishment of equilibrium between these different kinds of molecules (inner equilibrium), has led, when applied to metals, to a theory of electromotive equilibrium. Herein it is assumed that with metals the complexity consists in the existence of atoms, ions (of the same or of different valency) and electrons. These various particles give rise to an inner equilibrium which in the simplest case is represented by the formula :



in which  $\nu$  indicates the number of positive charges on the metal ion, and the suffix  $s$  that the solid state is being considered.

From this point of view, polarisation occurs if the withdrawal of electrons and the combined ejection of ions, respectively the supply of electrons and the combined deposition of ions, takes place more rapidly than the establishment of the inner equilibrium. If there is no formation of molecules, this can only be due to a too slow course of the reaction mentioned above.<sup>1</sup> By sending a metal rapidly into solution, for example, by means of an electric current, according to these considerations the metallic surface will become impoverished as regards electrons and ions, and the theory shows that in this case the metal will behave electrolytically as a more noble metal, which normally contains a smaller electron- and ion-concentration. Consequently, a base metal temporary can transform superficially into a pseudo-noble state by rapid anodic solution.

Now the question arose if experiments in the same direction, but arranged differently, could possibly lead to wider and deeper disturbances. In connexion with secondary phenomena, such as the discharge of anions, contact with an electrolyte is an important hindrance to creating a powerful disturbance. This difficulty is removed, of course, if, instead of a liquid, a rarefied inactive gas is used. That also, in inactive gases, metals show polarisation phenomena, is found by Gaede and others, but while by their point discharges only small current densities were acting, the disturbance could not be large. It is clear that the best method to obtain a large disturbance is to use the electric arc-flame. For several years I have therefore intended to study different metals, in a vacuum lamp, in the hope that on increasing the current density the disturbance of the metal would become so large, that not only the valency electrons, on leaving their orbits, should be snatched away and thus prevented from falling back, but also the deeper electrons, and perhaps those of the nuclei, whereby, in the latter case, also  $\alpha$ -particles could be split off.

Much occupied by other investigations, the experiments mentioned above were delayed. I was greatly interested, therefore, to read, in July last, the communication of Prof. Miethe on the transformation of mercury

<sup>1</sup> See "The Theory of Allotropy," p. 130.