yellow than is wool on the crest of wrinkles and on Rimington and Stewart's analysis contains a high proportion of sweat. We have concluded, therefore, that sweat is probably a factor in crutch strikes as well as in body strikes.

Our evidence and conclusions are being published in detail in Pamphlet No. 48 of the Committee of the Council for Scientific and Industrial Research.

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Inland Water Survey

I HAVE read with interest the leading article on inland water survey in NATURE of October 27 and the comments on Mr. Alan Chorlton's letter in NATURE of November 10, and Prof. W. S. Boulton's letter in the issue of November 17.

It is becoming more clear that there is considerable opinion in favour of keeping the administrative hand in the position to control survey; and that undoubtedly means the subservience of the machinery of pure survey to the immediate requirements of regional committees and the like. This is where confusing results come in.

Prof. W. S. Boulton has, like many others, unfortunately, considered only water supply, whereas there are other water interests which are more dependent on water survey. It seems to be forgotten that the case for the independence of water survey is considered to be proved by the Inland Water Survey Committee of the British Association. It would be a great disaster if the next move towards a central water authority only resurrected the chaos of records, inquiries and the like which has characterised the past.

Undoubtedly, the dual aspect, which Prof. Boulton mentions, must be kept in mind, and this aspect is present in land survey organisation. The Ordnance Survey is under the Ministry of Agriculture and Fisheries, and it has been called upon for, and carried out, the boundaries of the catchment board authorities. There has been no step to follow up this piece of national survey by national water survey of rivers. Every water interest will have to take its part in the observational and record side of water; but it is imperative that there shall be a central survey authority for direction and supervision.

Looking at the matter from the point of view of efficient survey, it seems to be more important than ever that survey should be freed from the opposing interests of Ministries, first of all; and the Joint Committee of the British Association and Institution of Civil Engineers has stated fairly clearly the type of administrative control which might guide the activities of the water survey authority, and it has also put in a few lines what is the general scope of water survey.

Various views will undoubtedly be expressed by many people interested in the subject, but surely the views of those who have worked intimately at this problem for the last two years should receive the most careful consideration and even some practical development. The alternative is undoubtedly the easy course of placing the water survey authority under the Ministry of Health; but the danger is obvious. It seems impossible that this Ministry will be able to cut the interests of pure survey out of the hands of those who go very far to determine the actions of the Ministry. When the Admiralty and Ordnance surveys were founded, conditions were different from those now existing; and it may be doubted if a Ministry would now be regarded as the most suitable body to maintain those surveys or to create either water or air survey on equally efficient and economic lines.

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Diffusion of Gases through Metals

THE rate of diffusion of gases through metals has been found to be approximately proportional to the square root of the gas pressure, and is generally represented by the equation $D=K.\sqrt{P}$. Borelius and Lindblom[1] made accurate determinations of the rate of diffusion of hydrogen through various metals and found their results were more nearly represented by the empirical equation $D=K\ (\sqrt{P}-\sqrt{P_t})$ where P_t was a threshold value of pressure below which no diffusion took place.

We have measured the rate of diffusion of hydrogen through copper, nickel, iron and molybdenum and nitrogen through molybdenum. We confirm the departure from the square root law at low pressures, but not the existence of a definite threshold value of pressure. At low pressures the rate of diffusion falls off, becoming progressively less than would be expected from the square root law. It appears to us that the effect of adsorption on diffusion has been neglected, and that if this is taken into account the experimental results can be satisfactorily explained. Diffusion must be preceded by adsorption on the surface, and the rate of diffusion must be proportional to the amount of gas adsorbed. Diffusion measurements are not generally made under conditions where a complete unimolecular layer is adsorbed, so that with each increase in pressure a larger fraction of the surface becomes covered. This factor may be included in the diffusion equation by introducing the Langmuir isotherm $\theta=\frac{ab\,P}{1+aP}$ where θ is the fraction of the surface covered by adsorbed molecules. The diffusion equation then becomes $D=K\ (\frac{abP}{1+aP})\ \sqrt{P}$, which satisfactorily represents our experimental results.

We have also checked this equation by inserting the adsorption constants obtained from Gauger and Taylor's[2] isotherms for hydrogen and nickel, plotting the curve, and extrapolating the sensibly straight part until it intercepts the pressure axis. The value of pressure obtained in this way is in close agreement with the so-called threshold value found by Borelius and Lindblom for the same system.

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