LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Molecular Attractions in Solutions.

THE following is, so far as I know, a new method of attacking this problem. I have been working at the experiments for some time, but on account of the war progress in the matter has come almost to a standstill. It seems desirable to publish this brief preliminary note now.

Let A and B be two pure liquids miscible (completely miscible would be better still) over a large range of concentrations. Let the densities and compressibilities of the liquids and their mixtures be known. Then, taking the simplest case (*i.e.* one in which there is no association either in the mixture or in the pure liquids), we may postulate that if there be a change in volume on mixing, this change is caused by the algebraic sum of the alterations in the attractions of A to A and B to B, together with the added effect of the new attractions of A to B.

The sum of these three effects can be calculated with considerable plausibility. Consider any definite mixture, the coefficient of compressibility of this mixture being supposed known over a wide range of pressure. As we know the coefficient for the separate pure liquids, we could calculate the theoretical coefficient of the combination. From these data we can get an approximate value for the mean coefficient of compressibility of the mixture while passing, so to speak, from the theoretical combined state to that which ultimately prevails. Then the change in volume divided by this mean coefficient gives the change of internal pressure on mixing. Now, if this method be followed by a number of different concentrations, a series of different changes in internal pressures will result.

If it is desired to disentangle the various internal attractions from one another, this can only be done by trial and error. The following development of Laplace's method may be tried. Assume that the attractions are proportional to the mass of the operative particles, then, calling the changes of pressure P_1, P_2, etc., and referring the concentrations to a gram-mol. of liquid A, let V be the volume of the mixture which contains 1 gram-mol. of A, and n the accompanying mass of component B.

The change of attraction of A to A in mixture (1) will be proportionate to α/V_1^2.

The change of attraction of B to B in mixture (1) will be proportionate to $\beta n_1^2/V_1^2$.

The change of attraction of A to B in mixture (1) will be proportionate to $n_1\gamma/V_1^2$.

From these quantities we get a set of equations:—

$$P_1=(\alpha+n_1\gamma+\beta n_1^2)/V_1^2,$$
$$P_2=(\alpha+n_2\gamma+\beta n_2^2)/V_2^2, \text{ etc.,}$$

where α, β, and γ are algebraic quantities.

There are some reasons for supposing that γ may be equal to $(\alpha\beta)^{\frac{1}{2}}$; if so, α and β can be calculated from any two of the equations, when P_1, n_1, etc., are known, and hence the validity of the assumption may be tested over any range of concentrations. Obviously a formula of this type would not meet the case in which the two liquids can mix in all proportions without change of volume; but it is possible that although the total pressure now remains constant, yet there may have been a redistribution of pressure among the constituents.

It may be mentioned that even an empirical formula giving approximate values for the separate internal pressures would be of considerable help in deducing a correct equation of state for the osmotic pressures of solutions.

BERKELEY.

Foxcombe, May 24.

Meteorological Conditions of a Blizzard.

As used to signify a certain type of snowstorm primarily characterised by fine, dry, powdery, or sand-like snow driven before a gale of wind, the temperature of which is extremely low (say 20° below zero F.), the term "blizzard" is, of course, wholly inapplicable in the British Isles; and it is, moreover, ridiculous to apply the name to every little occurrence of sleet after the manner of the daily Press, referred to by Mr. Dines. But there is another type of severe snowstorm peculiar to damp, stormy, and relatively warm winter climates like our own, the natural breeding-grounds of which are the wild tracts of bleak, elevated moorland which cover so much of the north of England and Scotland; and I fail to see why "blizzard," which, after all, comes from the same root as "blast," should not be as expressive of a British moorland snow gale, with its relatively large damp flakes, as it is of the fine dry crystals of North America or the polar regions, produced by meteorological conditions practically unknown in this country. The huge falls of snow swept by heavy gales which isolated many high-lying districts of Great Britain for weeks together in February and March of the present year (see *Symons's Meteorological Magazine* for April), bringing in a few weeks an aggregate depth of some 10 ft. to the Black Mountains in South Wales, were, it seems to me, not inappropriately described as "blizzards"; but for the sake of distinction it might be advisable to restrict the use of the term to the American type of storm.

Mr. Dines refers to January 18, 1881, as affording the nearest approach to an American blizzard in the S.E. of England; but possibly an even better approximation was the great storm of March 9–13, 1891, in the S.W. of England. In Devon and Cornwall the "great blizzard" of that spring is now a household word, and I do not think that anyone who either experienced that west-country visitation or has read the vivid narratives regarding its effects will feel inclined to quarrel with the designation.

L. C. W. BONACINA.

Hampstead, N.W., June 2.

SIR ERNEST SHACKLETON'S ANTARCTIC EXPEDITION.

SIR ERNEST SHACKLETON has fully justified the faith of those who were confident that if he did not cross Antarctica his expedition would make valuable additions to the geography of the little-known area of the Weddell Sea and that he would act with the combined daring and sound judgment necessary to success in what was admittedly almost a geographical forlorn hope. He is to be congratulated on his return after one of the most adventurous of Polar expeditions; for its voyage on the ice-floes has been only equalled in perils by that of the Hansa Expedition; his heroic passage in search of help across the stormy seas south-east of Cape Horn during an Antarctic winter will rank among the finest examples of seamanship achieved in an ordinary ship's boat; and, having landed on