Sir William Barrett, it appears that there are other dowsers who are honest, and it really seems to me that the cause of the dowser's sensations which may lead to the discovery of water is as worthy of study as, say, the polarisation of light that may be used for the microscopic determination of minerals. The investigation may, I think, be better undertaken in either case by specialists who are not concerned with the applications. If there is anything in water-divining, I am sure that it is not occult in the sense of "involving the supernatural, mystical, magical," and if it be occult in the sense of being "beyond the range of ordinary knowledge" (both definitions are given in the Concise Oxford Dictionary) I only urge that efforts should be made to extend that range as it has been extended in recent years to clear up other obscure phenomena. HUGH ROBERT MILL.

The Pressure of Gaseous Mixtures.

A CURIOUS and somewhat unexpected property of the pressure of a gaseous mixture has come to my notice from an examination of some recent experimental work. Holborn and Otto (*Zeit. f. Phys.* **23**, 77, 1924; and 33, 1, 1925) have determined the isotherms of a mixture of helium and neon, and of helium and neon alone, and have shown that the isotherms can in each case be represented with great accuracy by a formula of the type

$$pv = A + Bp,$$

when A and B are given suitable values. Since B is small (of the order 10^{-3}), this equation can also be

$$pv/A = 1 + B/v,$$

where v in each case is the ratio of the volume to the volume under standard conditions, and is therefore inversely proportional to the molecular concentration. It follows that B is a measure of the deviation from the perfect gas law. The curious fact emerges that for the same temperature the value of B for a binary mixture may be greater than that of either of the constituent gases. In other words, the pressure of a gaseous mixture may be greater than that of either of its constituents, even when the molecular concentration and temperature are in all cases the same.

I hear, too, from Prof. Masson that Dr. Gibby and he have also discovered the same phenomenon independently in some experiments with mixtures of hydrogen and helium. They are at present extending their work in order to examine this question more closely.

The explanation is to be sought in terms of intermolecular forces. Cohesive forces between molecules tend to lower the pressure, while repulsive forces tend to increase it, and the relation of the one effect to the other depends on the temperature. A mathematical investigation for the particular case when both fields can be represented by inverse power laws (*Proc. Roy. Soc.*, A, 112, 214; 1926) shows that at low temperatures the cohesive forces outbalance the repulsive and the deviation from the perfect gas law (B) is negative. With increasing temperature the effect of the repulsive fields becomes increasingly important until ultimately B becomes positive. Finally, a temperature is reached for which this positive deviation is a maximum, and then the correction falls asymptotically to zero.

This maximum property of the deviation, indicated by theory, is borne out by experiment (Holborn and Otto, *Zeit. f. Phys.*, **23**, 86; 1924). The temperature at which the deviation is a maximum is $-140°$ C. in the case of helium, 150° C. in the case of hydrogen, 260° C. in the case of neon, etc.

In this maximum property lies the explanation of the increased pressure of the gaseous mixture. The temperature of maximum deviation of a mixture lies between those of its two constituents, and near this temperature the deviation of the mixture from the perfect gas law is greater than that of either of its constituents. For a certain range of temperature the pressure of a gaseous mixture may therefore be greater than that of the same concentration of either gas alone.

Furthermore, theory provides an expression for the relative proportions of the gases of a mixture for which the pressure is a maximum at a given temperature. The already-mentioned work of Dr. Gibby and Prof. Masson will, it is hoped, prove to have provided experimental evidence to test this result.

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Members and Correspondants of the Académie des Sciences, Paris.

IN an obituary notice of the late Sir George Greenhill, published in NATURE of Feb. 26, it is stated that he was "a corresponding member of the Paris Academy of Sciences." Sir George was *not* a corresponding *member* of the Academy of Sciences. He was a 'Correspondant' of that Academy 'pour la section de mécanique,' elected in 1921. Similarly, it is stated in the same issue in the obituary notice of the American palæontologist Walcott, that that distinguished American was "a corresponding member" of the Academy of Sciences of Paris. He was not, but was elected by that Académie as 'Correspondant' in the section of mineralogy in 1918. In 1919 he vacated that place on being elected one of the twelve 'membres associés étrangers' of the Academy.

The fact is that the title 'corresponding member' is not employed by the Académie des Sciences—nor by the other Académies which are united as the 'Institut de France.' The individuals constituting one of these Academies are in the first place "Messieurs les Académiciens, membres titulaires de l'Académie." In the Académie des Sciences there are 68 of these 'titular' members, to whom have been added by successive decrees of the State government—10 membres libres, 6 membres non-résidants, 6 membres de la division des applications de la science à l'industrie; and 12 membres associés étrangers. These 102 'membres' of the Academy are classed officially as 'Messieurs les Académiciens,' 'membres de l'Institut.'

Each Academy, excepting the Académie Française, has in addition been empowered to elect *not* 'corresponding members' but *Correspondants*. The Académie des Sciences has 116 'correspondants,' approximately ten to each of the sections into which the Academy is divided. They are *not* 'Académiciens' nor 'Membres de l'Institut.'

There is no restriction as to the nationality nor as to the residence of persons eligible by the Académie des Sciences as "Correspondants." They may be French nationals or foreigners.

The 'membres associés étrangers'—of which there are twelve in the Académie des Sciences—are the nearest equivalent to the 'corresponding members,' the 'foreign members,' and 'foreign correspondants' of some other academies and societies.

Very full information as to the Institut de France and the members and correspondants of its five Académies is to be found in the "Annuaires" published yearly by the Institut and by each Academy. An English account of the history and present organisa-