The success of the search depends largely on what is meant by a sensation. Some psychologists hold that two sensations of the same kind cannot be experienced simultaneously. If they are right (and the question is not entirely one of words), sensations cannot possibly be measurable fundamentally; for it is quite certain that there is no process of addition whereby two non-simultaneous sensations can be combined so as to be equivalent to a single instantaneous sensation. If, on the other hand, we experience two simultaneous sensations when exposed to two stimuli, sensations can be combined and it is a question of experimental fact whether such combination satisfies the laws of addition. The most likely of these to fail is the associative law that, if a is equivalent to a' and b to b', then a combined with b is equivalent to a' combined with b'. For the sensation of brightness, this law (and certain others) are true within limits; that is why heterochromatic photometry is possible. Those who dismiss it as irrelevant on the ground that it measures stimuli and not sensations often fail to observe that heterochromatic brightness differs from homochromatic brightness and other typically physical magnitudes, because it cannot be measured by 'physical' methods, independent of any *specified* form of sensation; its measurement is inseparable from a sensation of a particular kind.

The law need not, however, be true for sensations of other kinds. It is almost certainly untrue for painfulness; and I doubt whether it is generally true for loudness. The loudness of added sounds is probably affected by their concordance or dissonance. But the experiments that might decide the matter definitely do not seem to have been made; until they are made, it is waste of time to discuss whether sensations are measurable.

Some people seem to believe that, though sensations are not measurable by either of the two physical processes, they may be measurable by some third process inapplicable to the magnitudes of physics. They should remember that physicists will not accept any process as measurement, unless it is based upon laws the validity of which is appreciable equally by all observers who are not so abnormal as to fail to appreciate their meaning.

NORMAN R. CAMPBELL.

THE two letters printed above emphasise the necessity for further discussion of the problem—a discussion which may very well be applied both to the vast mass of existing experimental data, and to the conditions under which fresh data may be sought.

The reason for the line of development adopted in my article will be apparent to anyone acquainted with the literature of the subject; and, as was pointed out clearly enough in the text, one of the primary matters to be considered in a future discussion is that of the application to the problem of the fundamental principles of measurement, the importance of which Dr. Campbell so rightly stresses. Anything that Dr. Campbell has to say on such a subject will be heard with respect; nonetheless, readers of his incisive letter should remember that a vigorous statement is not necessarily a final statement of the truth.

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Lubricating Oils and Cancer

THE letter from J. B. Speakman and N. H. Chamberlain,[1] suggesting that "the incidence of dermatitis and tumours may be caused by the difficulty of removing mineral oil from the skin", is supported by the fact that unsaturated mineral oils on exposure to light and air form compounds which are not emulsified by soaps, and which form coatings on wool fibres that are only removed with difficulty by solvents, and not at all by soaps. This insoluble layer is a possible source of irritation. Crude shale oils give a considerable amount of such insoluble compounds.[2]

Also, in the course of research work by the second of the undersigned, on emulsification problems in scouring of wool and wool fabrics, it has been noted that the ionisation process developed by E. V. Hayes-Gratze in co-operation with the Wool Industries Research Association, applied to a variety of oils, especially vegetable oils, gives striking results.

It gives products of greatly lowered surface tension, and highly water-emulsifiable nature, providing a means of wool oiling whereby not only are "oxidised oil" defects, to which commercial lanoline is subject, eliminated, but subsequent scouring is accomplished with the greatest ease.

In addition, hospital tests have shown that ionised oils possess remarkable curative properties in treatment of obstinate cases of dermatitis and ringworm, so that it may be inferred that their presence would tend to prevent skin infection, apart from facilitating removal of oil contamination.

H. R. HIRST.
A. T. KING.

Wool Industries Research Association,
Headingley, Leeds.
Nov. 7.

[1] NATURE, **130**, 578, Oct. 15, 1932.
[2] Hirst, *J. Soc. Dyers and Col.*, Dec. 1931.

A Continuous Spectrum of Pure Argon

IN the course of investigations that have been made at the Electrical Laboratory, Oxford, of the electrical properties of argon, it was found that when the gas is obtained in a high degree of purity several phenomena occur, in the appearance of the discharge and in the spectrum of the light emitted, which do not appear to have been noticed before. The argon was carefully purified by a method which will be described in another paper. It was examined spectroscopically at pressures from 1 millimetre to 150 millimetres and no lines due to impurities were detected in the range of wave-lengths from λ 2000 A. to λ 7000 A.

It was found that when an electrodeless discharge was excited in argon by continuous oscillations of about 100 metres wave-length in a tube 1·7 cm. in diameter, the discharge assumes two forms which depend upon the pressure of the gas and the intensity of the current. When the current in the tube is large, the discharge is a striated column, the striations consisting of globules (the size of which decreases as the pressure is increased) which lie along the axis of the tube between the electrodes; a form of the discharge which has already been described in a previous paper.[1] A recent photograph of this type of discharge in pure argon at about 40 mm. pressure is shown in Fig. 1. When the current in the tube is decreased, the striations disappear and the distribution of light in the tube takes the form shown in Fig. 2. In the striated column the colour