Letters to the Editor

Our Report is not so innocent of conclusions as the review suggests. These conclusions are set forth in detail and can be studied by anyone who cares to consult the Report. I must repeat that we have not said that noise, particularly loud discontinuous noise, does not prejudice efficiency. We have stated and demonstrated the exact opposite. We have also stated and demonstrated that the direct effects of noise upon work are often exaggerated. We have stated and demonstrated how rapidly some of these effects can be countered by physiological and psychological processes of adaptation.

My impression is that Dr. McKenzie thinks that experimental work on the special senses ought to be carried out by, or under the direction of, the medically trained specialist alone. The assumption is apparently that only the medically trained specialist can possibly have the necessary knowledge of the physiology of the special senses. The history of scientific investigation in this field, a history in which this Department has taken some share, does not bear out such an opinion. I must protest that, whatever the value of this particular Report may be, the Medical Research Council are not to be blamed because it did not occur to them to adopt so extraordinary a view.

Yours faithfully,

Cambridge. F. C. BARTLETT.

TO THE EDITOR,

The Journal of Laryngology and Otology.

SIR,—The critical review of the Report of the Hearing Tests Committee scarcely presents the facts, which will justify what its author, Mr. C. S. Hallpike, calls a communication of destructive tone, for his claim that the Committee have omitted all references to the facts in Wegel's Chart is not supported, when we find the line of minimal intensity on this chart described on page 15, XXI, ii., paragraph 2, of the Report, and a warning issued against the use of notes of great intensity in the "effects of pitch on auditory fatigue", page 20.

Nor will his readers be stimulated by the suggestion that we should record the air conduction on a graph, and bone conduction separately, on the grounds that we know little more of the path of bone conducted sound than in the time of von Bezold. Nor again will they follow his attack on the Committee when he says that the Committee confuses the definition of deafness in a surprising way and quotes as evidence, between inverted commas, a sentence which is nowhere to be found in the Report. It is clear that it is not the Committee, but Dr. Hallpike who is creating the confusion.

The issue raised by Dr. Hallpike's paper is whether otologists should continue to record the number of seconds for which they hear a fork longer than a patient, or whether they should convert

the number of seconds into terms which have a definite meaning, in that they record the intensity of sound which overcomes the inefficiencies of the hearing mechanism, which are known collectively as deafness. Dr. Hallpike agrees with the Hearing Tests Committee that the measurement in intensities is essential. He differs from the Hearing Tests Committee in his contention that logarithms should be used as an expression of the intensity, while the Hearing Tests Committee advocate that simple multiples of two should be employed.

It is clear that the majority of otologists in England, in the United States, in Germany, and in other countries, do not wish to adopt in their clinics and consulting rooms a method which presumes the knowledge of the use of logarithms, and makes the assumption that they have a set of logarithm tables for their constant reference. The same results may, however, be obtained by the method that the Hearing Tests Committee recommends. All otologists are already accustomed to working with these simple multiples of two, with reference to pitch, for simple multiples of two are known as octaves. The use of logarithms is, in fact, confined to laboratory workers, and the decibel is the unit throughout the world in all acoustic laboratories, and for this reason telephone workers who design the audiometers have imposed the decibel upon otologists. Otologists have, to a limited extent, adopted them, and in many cases have not grasped the intensities they represent. As an example of which, we may quote Dr. Hallpike's own figures, for in the chart that he recommends he cites the use of notes of 130 decibels, which is a sound which can be heard at several miles, and borders on the threshold of an intensity which will cause damage to a normal ear. To gain the record of so great an intensity he has to sacrifice the accurate recording of the less intense sounds, the inability to hear which is the important factor in the initial states of deafness. Thus the " positive contribution " which he gives with the object of tempering " the destructive tone of his communication " is a chart for recording tests of hearing, on which diminutions of hearing distance of between 0 per cent and 70 per cent have to be recorded in 1/10th inch, while the whole range of hearing for conversation is allotted only 4/10 inch, 9/10 being given for diminutions of the hearing distance, such that the conversational voice is heard at a lesser distance from the ear than $2\frac{1}{2}$ inches.

This all comes from endeavouring to quote intensities in logarithmic terms, and, at the same time, failing to render intensity of sound so quoted, into terms of hearing distance.

Dr. Hallpike suggests that it would be a good thing if the decibel and the half intensity period of each fork were given when they are tested. The National Physical Laboratory already furnish this information for every set of forks sent to them. As

regards the definition of a decibel it will be best to give the information furnished in the report which the National Physical Laboratory sends back with every set of Tuning Forks which they calibrate.

"If I and I_o are two different values of the sound energy, the difference L in intensity level expressed in decibels is given by $L = 10 \log_{10} (I/I_o)$. A decibel is approximately the smallest change of intensity that the ear can ordinarily detect.

The 'half intensity period' of a fork is the time taken for the energy of the fork to decay to one-half of its original value, i.e. to decay by 3·0 decibels."

I would add to this that the National Physical Laboratory regards the decibel as the only unit which should be used for precision work, but that they do not consider that auditory testing is precision work.

The half intensity unit is by far the more intelligible to Otologists and to use decibels for recording of hearing tests is to pretend an accuracy which the tests do not possess. The half intensity unit is plainly the more suitable for Otologists, in fact it may be said that the decibel should not be employed for the expression of the results of tests of hearing.

I am, Sir,

Yours faithfully,

A. LOWNDES YATES.

TO THE EDITOR,

The Journal of Laryngology and Otology.

DEAR SIR,—I have read with great interest the articles in the January and February numbers of the *Journal of Laryngology* which contain the Report of the Committee on Hearing Tests. They are of interest to the physicist because of the application of the tuning fork, monochord and Galton whistle, and because of the rejection of the newer electrical means of producing and maintaining audible vibrations.

As some of your readers may possibly be misled by two slips which have entered into the reading matter, it may be well to have these pointed out, if this has not been done already.

In the January number, on page 27, the first overtone of a tuning fork is referred to as being "usually about six octaves above the fundamental note of the fork". The frequency of this overtone is on the contrary, usually about six times the frequency of the fundamental, or, say, about two octaves and a fifth above the fundamental note of the fork. This overtone is prominent in many forks just after they have been struck, but generally dies out rapidly. When it is unpleasantly prominent, it may be much reduced by the simple expedient of placing a small, thin rubber band on each prong