

LETTER TO THE EDITORS

THE EDITORS,

Journal of Laryngology.

SIRS,—Mr Wilkinson's model demonstrating the Resonance Mechanism of the Cochlea was presented at the Tenth International Congress of Otology held in Paris in July of this year, and was communicated to the Physiological Section of the British Association at their meeting at Hull in the following September. Mr Wilkinson was not acquainted with the model which was described by me in 1914, and it was in Paris that Gradenigo drew his attention to it. In the communication to the British Association he alluded to it, in passing, as follows: "Operating models have been previously constructed like those of Ewald, Stefanini, Lehmann, Lux, and Rolfe. I maintain that none of these represent adequately the conditions present in the cochlea, and the conclusion which can be drawn from them is either misleading or of very partial application."

It follows that Mr Wilkinson believes that my model cannot furnish a decisive demonstration of the functioning of the basilar membrane, to which structure his own apparatus approaches more closely in so far as the tension and the mass of the fibres vary, as well as their length. That his apparatus conforms more than any other to the structure of the basilar membrane is very true, but when I devised my model it was my intention to dispose of one of the most serious objections that were being made to the Cotugno-Helmholtz theory, objections which seemed to be confirmed by the results yielded by the Ewald acoustic camera, which appeared to show that it was impossible for the fibres of the basilar membrane to vibrate separately to various notes as they were so closely connected by the cellular membrane covering them. It was maintained in fact by the opponents of the theory, that this could only happen if each fibre acted independently.

It is strange that in the discussion that followed Mr Wilkinson's paper, whilst A. A. Gray, Ritchie Rodger, and Sir James Dundas-Grant recognised the decisive value of the demonstration, Professor Urban Pritchard declared that he still persisted in his old opinion which was, that the basilar membrane had nothing whatever to do with the perception of sound, because these fibres were not free, which they would have to be in order to function as resonators, and because, at the distal end of certain cochleæ, there was no basilar membrane but only an organ of Corti. In the course of the communication Mr Wilkinson had justly observed that in order to vary conveniently the mass of the fibres, all of which probably have the same density, and also in view of

General Notes

their shortness, it was necessary that they should be "loaded" by an amount of fluid which varies as the distance of the fibres along the membrane from the basal end, and that it was therefore necessary for them to be united by an impermeable membrane. As I have already observed in my paper on the resonance theory, it can also be added that if the fibres were free, and each one of them responded to a single note, taking into account the limited number of them, a sound varying continuously in pitch would appear to ascend by steps, and not continuously. But though the various sections of the cloth inside my model are more closely connected with each other than the various sections of the basilar membrane, yet they vibrate separately and to specially determined sounds which are emitted in their vicinity, even when the cloth is immersed in water. It appears to me that this observation of mine is completely vindicated.

Mr Wilkinson's model is much more complicated, very difficult to construct, and very expensive. It only comprises the results which I had obtained with the simplest means. In addition, my model demonstrates the field of resonance for each fibre, which is perhaps not possible, at least not in the same easy and self-evident manner as in the Wilkinson model.

In any case I expressed the opinion, before the description of Mr Wilkinson's apparatus was published, that the result obtained from a model on lines, which conform more closely than mine to the structure of the basilar membrane, would suffice to vindicate definitely the Cotugno-Helmholtz theory and explain all the facts relative to the perception and analysis of sound. A. STEFANINI.

PISA.

[The attention of the reader is directed to the Abstract on p. 634 describing Stefanini's model. Both the Abstract and the above Letter have been translated from the Italian version of the MS. sent to us.—Eds.]

GENERAL NOTES

ROYAL SOCIETY OF MEDICINE.

1 *Wimpole Street, London, W.1.*

Section of Otology—President, Mr Hunter F. Tod, F.R.C.S.; *Hon. Secretaries*, Mr F. J. Cleminson, M.Ch., and Mr Archer Ryland, F.R.C.S. Ed.

The next Meeting of the Section will be held on Friday, 19th January 1923, at 5 P.M.

Members who propose to show patients, specimens, etc., should communicate with the Senior Secretary, Mr F. J. Cleminson, 32 Harley Street, London, W.1, at least twelve days before the Meeting.