

**THE WORLD OF SOUND, SIX  
LECTURES DELIVERED BEFORE A  
JUVENILE AUDITORY AT THE  
ROYAL INSTITUTION,  
CHRISTMAS, 1919**

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The world of sound, six lectures delivered before a juvenile auditory at the Royal Institution,  
Christmas, 1919 by Sir William Henry Bragg

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**SIR WILLIAM HENRY BRAGG**

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Physics  
Acoustics  
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# THE WORLD OF SOUND

*SIX LECTURES DELIVERED BEFORE  
A JUVENILE AUDITORY AT THE  
ROYAL INSTITUTION, CHRISTMAS, 1919*

BY

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TO  
PEGGY, GWENDY, AND PHYLLIS

WHO DISCUSSED WITH ME SO MANY OF  
THE THINGS IN THIS BOOK AS WE  
WALKED TO SCHOOL IN THE MORNINGS

AND TO

ALL THE OTHER JUVENILES  
(INCLUDING THOSE OF THE GROWN-UP  
VARIETY) WHO CAME TO THE CHRIST-  
MAS LECTURES AND MADE SUCH A  
KINDLY AUDIENCE

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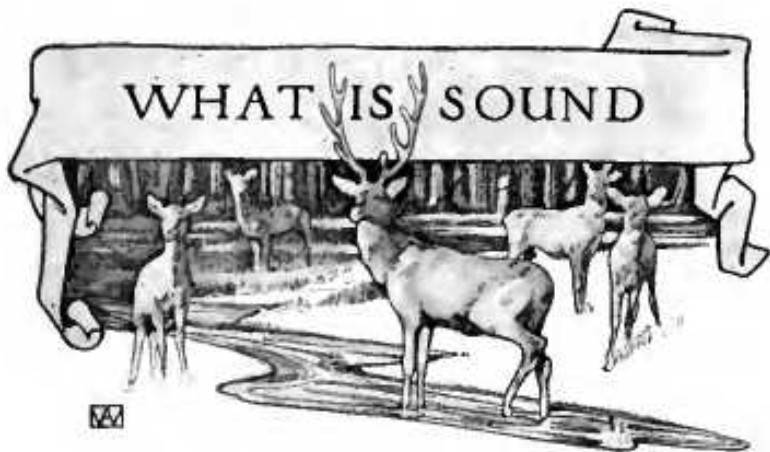
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## ILLUSTRATIONS

THE decorative headings and tail-pieces to the Lectures, and the pencil vignettes in the text, are reproduced from drawings by Miss AUDREY WEBER ; while the illustrations of the actual experiments are by Mr. W. B. ROBINSON, from material supplied by the Author.

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**A**LL around us are material objects of many kinds, and it is quite difficult to move without shaking some of them more or less. If we walk about on the floor, it quivers a little under the fall of our feet ; if we put down a cup on the table, we cannot avoid giving a small vibration to the table and the cup. If an animal walks in the forest, it must often shake the leaves or the twigs or the grass, and unless it walks softly with padded feet it shakes the ground. The motions may be very minute, far too small to see, but they are there nevertheless.

Besides the obvious surroundings of material things, there is an ocean of air in which we live. We cannot move without stirring it ; and, moreover, whenever we make anything else move, as when we shake the ground or the branches or the

table or whatever it may be, the air is shaken too because it touches all these objects and moves when they move. It is very easy to set the air quivering, and when once a quiver is started it runs through the air in all directions till it has spread and weakened and died away. Also it is a very curious thing that the air can carry ever so many quivers at the same time, going in many different directions, and of many varieties. But each travels as if there were no other there. We will presently consider an experimental illustration of this fact.

Now since nothing can be done without starting shakes and quivers, in solids or in liquids or in air, in some or all of them, and since it is very important to every one to know what is happening round about him, so far as it is possible to do so, it is not surprising to find that we human beings, and most animals, possess organs especially fitted to detect these shakes and quivers, and that we make great use of them. The ear is marvellously sensitive to the minute quiverings that come to it through the air, and then pass down the tube of the ear and come finally to the delicate organs within. We say that we hear a sound, which means that somewhere or other an air quiver has been started and has reached our ears. As the life and processes of the world go on the actions which take place are accompanied by these tremors, and we live in