

Popular audiology in the second half of the nineteenth century. The pedagogue Ferdinando Dobelli and the explanation of how sound and hearing work

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Abstract. In the 1860s, a series of short popular issues dedicated to the most disparate aspects of knowledge was published, with particular attention to topics of a technical-scientific and medical culture. Among the described themes there is also the illustration of the functioning of sound and hearing by the pedagogue Ferdinando Dobelli. In his characterization, rendered simply but accurately, Dobelli also uses numerous examples, parallels and experiments that support what has been said in order to make the explanation more effective.

Key words: sound, hearing, audiology, scientific dissemination, ear

To the Editor,

In the second half of the nineteenth century, Medicine and Science, through their popularization under the impetus of Positivism, sought to vigorously enter the homes of large sections of the population. Doctors, scientists and popularizers tried their hand at the transmission of medical and technical-scientific notions, conveyed through simple language and with numerous practical examples (1). This is demonstrated by the numerous topics collected and popularized in the series *Museo di cognizioni utili*, published in the 1860s by the Milanese publisher Giovanni Gnocchi di Giacomo. Among the various topics addressed through minute fascicles, many were devoted to technical-scientific-naturalistic and medical issues. One of the medical contents offered within the publishing series is dedicated to *Sound and Hearing* by pedagogue Ferdinando Dobelli (d.o.d. 1903) (2).

In this concise work, Dobelli illustrates the nature of sound and the functioning of hearing in a simple but comprehensive way (2). Dobelli begins his discussion by illustrating the importance, or rather, the necessity of air as a means of sound propagation, and to make evidence of this he describes a simple experiment with

a pneumatic machine. By removing air from a vessel within which a bell is placed, the sound of the latter cannot be heard since the transmission of sound vibration is not possible. Another experiment suggested is that performed through the percussion of a drum on whose membrane skin grains of sand are placed: it is possible to observe the grains moving upward with decreasing heights. Again, the pedagogue suggests experiences with the strings of some instruments or by striking an anvil with grains of sand on the surface. He then mentions experiments with a crystal plate and “rosin powder” and, unfailingly, the experience made by throwing a stone into a body of water: it is possible with the latter to observe the wave caused on the surface of the water. Dobelli compares the sound wave to a balloon expanding in all directions. He lists, briefly, the functioning of some wind instruments and disquisitions on the speed of sound, concluding the part devoted to the physics of sound with a description of the echo (2). He moves on, then, to a description of the workings of hearing, starting with the auricle shaped like a funnel to collect and convey the sound wave inside the ear. The sound vibration reaches, then, the membrane behind which are located, Dobelli describes, hammer, anvil, lenticular bone (lenticular process of

the anvil, Author' note) and stirrup. The hammer has the function of tensioning or not tensioning the tympanic membrane. The anvil transmits the movement to the lenticular bone and this to the stirrup. Inside the tympanic case is air. Vibrations are then transmitted to the oval and round window, which also function as a drum skin by transmitting sound vibrations reaching the inner cavity (inner ear, Author' note). A fluid is present here that fills some "little channels" The vibration is picked up by filaments of the auditory nerve and from them transmitted to the brain to be processed and transformed into sound sensation. Dobelli concludes his *excursus* with a description of two simple devices for reinforcing sound: the "loudhailer" for concentrating words and the "acoustic horn" for conveying sound to a now hard ear (2), thus hinting at the oldest instrument built to aid hearing (3).

Dobelli's brief popularized account testifies to how in the second half of the nineteenth century the question of sound and hearing was addressed from both a physiological and physical point of view and how it aroused extreme interest so much so that it was extensively investigated and popularized (4-6).

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