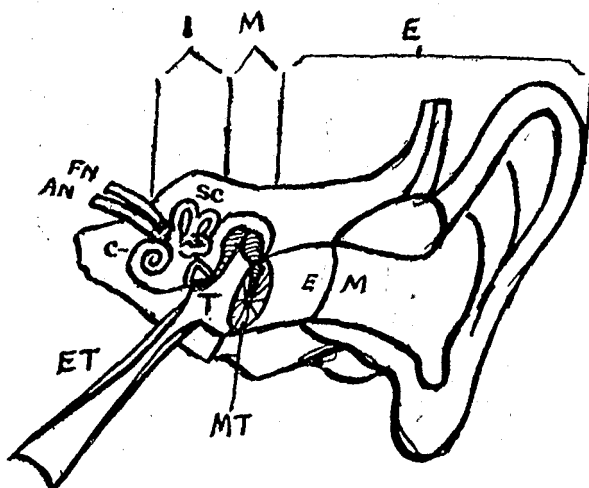


somewhat twisted. The outer half is cartilage (or gristle), the inner half bone. Owing to certain little slits in the gristle part, the canal can be made straighter by pulling the auricle upwards and backwards. This fact is taken advantage of in syringing the ear, as will be seen later.

At the bottom of the canal is the middle ear, or *tympanum*, closed where the canal ends by the *tympanic membrane*, or drumhead. Stretched across the middle ear from the drumhead to the inner wall is a chain of curiously shaped little bones, the *malleus* (hammer), *incus* (anvil), and *stapes* (stirrup). The hammer is attached by its handle to the drumhead, its head is jointed to the anvil, and the stirrup is attached by its head to the anvil, whilst its footplate occupies a little kidney-shaped hole in the inner wall of the *tympanum*.

The middle ear communicates, high up and behind, with a little space, called the *mastoid*



E.—External Ear. M.—Middle Ear. I.—Internal Ear. EM.—External Meatus. MT.—Tympanic Membrane. T.—Tympanum. ET.—Eustachian Tube. C.—Cochlea. SC.—Semicircular Canals. AN.—Auditory Nerve. FN.—Facial Nerve.

*antrum*, which is contained in the hard, bony part which you can all feel behind your own ears. This antrum is very important, and I want you to remember it carefully. In front the middle ear communicates with the throat by the Eustachian tube.

The inner wall of the middle ear is formed by the outer side of that part of the internal ear which is of bone. In it are two openings, the *oval window*, in which the stirrup plays, and the *round window*, just behind.

The *inner ear* consists of a cavity of complicated shape, surrounded by hard bone, and enclosing a membranous bag, which contains

the terminations of the nerve of hearing. These nerve endings are bathed in a fluid called the *endolymph*, and between the membranous internal ear and its outside wall of bone is another fluid called the *perilymph*. When you look at the whole internal ear, you will see that it consists of three distinct parts, the *cochlea*, coiled like a snail's shell, the three *semicircular canals*, and the *vestibule*, connecting them with the cochlea. It is the cochlea which contains the nerve ending (called the *organ of Corti*), specially concerned with the sense of hearing. The semicircular canals have to do with our sense of equilibrium, and that is why ear disease is so often accompanied by giddiness.

Before we leave the anatomy of the ear, a word must be said about the important structures which surround it. Lying over the roof of the middle ear and mastoid antrum are the great brain (*cerebrum*) and its membranes. Behind and internal to the antrum is the *cerebellum*, or little brain, and the *lateral sinus*, a big vein inside the skull, which later passes down the neck as the *internal jugular vein*. The top part of this vein lies under the floor of the middle ear. As a consequence of these relations, disease of the bony walls of the middle ear may and frequently do lead to meningitis, brain abscess, or inflammation of this large vein, and consequent blood poisoning. In front and inside the middle ear is the *internal carotid artery*, and bone disease there has been known to cause fatal hæmorrhage from that vessel. Another very important fact is that the *facial nerve*, supplying motion to the face muscles, passes through the middle ear, and *facial paralysis* is a common complication of middle ear disease.

Now you will probably all ask yourselves the question—How does all this complicated mechanism work? The waves of sound enter the outer canal and set the drum-head vibrating. This vibration is communicated to the chain of small bones, from the hammer through the anvil to the stirrup. By the movement of the stirrup bone in the oval window, these vibrations are passed on to the perilymph, thence through the membranous internal ear to the endolymph, by which they directly affect the nerve endings in the cochlea. The sensations to which this gives rise are conducted by the auditory nerve to the brain, where they are perceived and interpreted.

In the next lecture I shall try to explain simply to you the structure and functions of the nose and upper part of the throat, after which I shall pass on to discuss certain general considerations as to the nursing of diseases of that organ and of the ear.

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