

middle portions of the ear. The diagram (Fig. 1.) will enable you to understand this arrangement and how it works.

The external ear consists of the *auricle* (the expanded part which forms in animals and man the more or less prominent feature usually termed "the ear") and the passage which leads therefrom to the drum and which is named the *external auditory meatus*. This is a curved passage formed partly of cartilage and partly of bone. Owing to certain anatomical peculiarities this passage can be made straight by pulling it upwards and backwards, a fact which is made use of in syringing the ear.

The middle ear, also called the *tympanum* or drum, is a small chamber contained inside the temporal bone. It is separated from the outer passage by a delicate membrane called the *tympanic membrane* or "drum-head." The parchment of an ordinary drum is so stretched that it can only vibrate to one note, but the drum-head of the ear is arranged so that it can vibrate to all kinds of sounds. Opposite to the drum-head is the inner wall of the tympanum, which is made by the bony wall of the internal ear. This is pierced by two tiny holes, called from their shape the *round* and *oval windows*. Stretching between this wall and the drum-head is a small chain of three little bones, the *malleus* (hammer), the *incus* (anvil), and the *stapes* (stirrup). The hammer is outermost and is attached by its handle to the drum-head, the stirrup is the innermost and fits by its foot into the oval window. The anvil is placed between the two.

Communicating with the tympanum behind is a large air cell called the *mastoid antrum*, which is contained inside the *mastoid process*, the hard bony prominence which you can all feel behind the ear.

From the front part of the tympanum a narrow tube runs forward to the throat. This is called the *Eustachian tube*, and is intended to serve a double purpose. It drains the middle ear, and also ventilates it, so that the pressure of air is kept the same on both sides of the drum-head. Unless this air pressure on the two sides is equal, the drum-head cannot vibrate properly to sound. This fact I shall refer to again.

The internal ear consists of a complicated cavity, hollowed out in the temporal bone, and enclosing a little bag of membrane. In this membranous sac is the termination of the auditory nerve, lying bathed in a fluid called

the *endo-lymph*. The membranous bag itself lies in another fluid, the *peri-lymph*. The internal ear is divided into three parts, the *semi-circular canals*, which have to do with our sense of equilibrium, the *cochlea*, and a tiny chamber joining them, called the *vestibule*. The cochlea is shaped like a snail shell, and contains the nerve ending which is specially concerned with the sense of hearing.

Now let us see how all this complicated machinery works. Let us enquire into the physiology of hearing. Sound striking upon the ear is collected by all the little inequalities of the auricle and conducted down the outer passage to the drum head, which it sets vibrating. These vibrations are communicated to the chain of little bones, from the hammer through the anvil to the stirrup. By the movements of the stirrup in the oval window the vibrations pass to the peri-lymph, thence through the membranous bag to the endo-lymph, by which they reach the endings of the nerve of hearing. The sensations to which they give rise are carried by the nerve to the brain, by which they are perceived and interpreted. You can readily understand how easily these processes can be interfered with by disease of even the smallest portion of this apparatus.

Before proceeding further we will similarly examine the arrangement of the throat and nose, as those parts are so intimately connected with the ear, both in health and disease, that they cannot be neglected.

The nose serves a double function, it is the organ of the sense of smell, and it also forms a very important part of the breathing apparatus, as by its means the air taken in is warmed, moistened, and cleared of gross impurities. You all know when you have a bad cold in the head and you cannot breathe properly through the nose, how you wake up with the back of the throat very dry and parched; that is because the air you have been breathing all night has not passed through the nose and has therefore been neither moistened nor warmed, and such a state of things, continued over a long period, renders the throat irritable and dry, and injures the delicate lining of the lungs, so that they are more disposed to bronchitis and similar ailments.

The nose consists of two chambers, separated by a partition called the *septum*. They communicate in front with the outer air by the two nostrils, and behind by two other openings with the upper part of the throat, or *pharynx*.

[previous page](#)

[next page](#)