

How cats hear

All sounds consist of vibrations, and reach the ear as pressure waves in the air. The pitch of a sound depends on the frequency of the waves - the number of vibrations per second - and its loudness on their amplitude, or size. In order to be heard, the vibrations must trigger nerve signals to the cat's brain that differentiate between sounds of various frequencies and amplitudes. The part of the ear that does this, the **cochlea**, is deep within the bones of the skull; apart from the section concerned with balance, the rest of the ear - including the visible ear flap, or **pinna** - collects and transmits the vibrations to the cochlea.

Cone-shaped and equipped with more than a dozen muscles that enable it to be moved through 180 degrees and 'pricked' towards the source of a sound, the pinna collects the slightest sound vibrations. It funnels them down the auditory canal to the ear-drum. The latter's vibrations are transmitted to the cochlea by three tiny bones called the **ear ossicles**. These strengthen the vibrations, but an arrangement of small muscles attached to them can dampen down vibrations caused by loud noises, thus helping to prevent ear damage.

The structure of the feline cochlea enables it to respond to sounds as high as 65 kHz (65 kilohertz or 65,000 cycles/second) and possibly higher. This is at least 1½ octaves above the limit of human hearing, which is about 20 kHz, and even exceeds the better-known ability of the dog to hear high-pitched sounds. Human and feline hearing are not very different at low frequencies, the cat's lower limit being about 30Hz (30 hertz, or 30 cycles/second), but the cat's greater sensitivity to high notes is shown by its greater responsiveness to high-pitched human voices and to the squeaks of kittens and mice.

Some white cats ... have degenerative changes of one or both cochleas that cause deafness from the age of about five days. Cats also tend to be deaf in old age as the ear ossicles become less mobile and nerves in the inner ear degenerate. Ear infections can also affect hearing. Deaf cats probably compensate by a sharpening of vision and smell, and becoming extra-sensitive to vibrations (possibly 'hearing' through their feet).

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