an alien cell to express a functional membrane protein in sufficient density to recreate the motile response of a mature hair cell. So the authors looked for gating currents and voltage-dependent changes in cell capacitance — the electrical signature of the motor protein in normal outer hair cells. Gating currents are small, transient currents caused by the displacement of charged structural elements of a protein as it changes shape within a membrane. With a high density of protein, these charge displacements are associated with a voltage-dependent change in cell capacitance.

There must have been a rare sense of excitement when Zheng *et al.* started to analyse their experimental kidney cells. They not only saw a convincing electrical signature, but also recorded changes in cell shape. Critics may argue that any voltage-sensitive membrane protein expressed at sufficient density will generate the same effect. But cells transfected with pendrin, a similar transporter molecule, did not respond in this way. Furthermore, the response was at least partially inhibited by salicylate, which inhibits length changes in outer hair cells. The candidate gene, since christened *Prestin*, is also expressed specifically in cochlear outer hair cells. Its expression during development coincides with appearance of the membrane protein and with activation of cell length changes.

The work of Zheng *et al.*[1] will open up many research avenues. The predicted amino-acid sequence encoded by the *Prestin* gene yields little in terms of the structure of the protein, but the secrets of this new molecular motor should be revealed by mutational analysis both *in vivo* and *in vitro*. Modification or deletion of the gene in adult animals offers a new and more powerful way

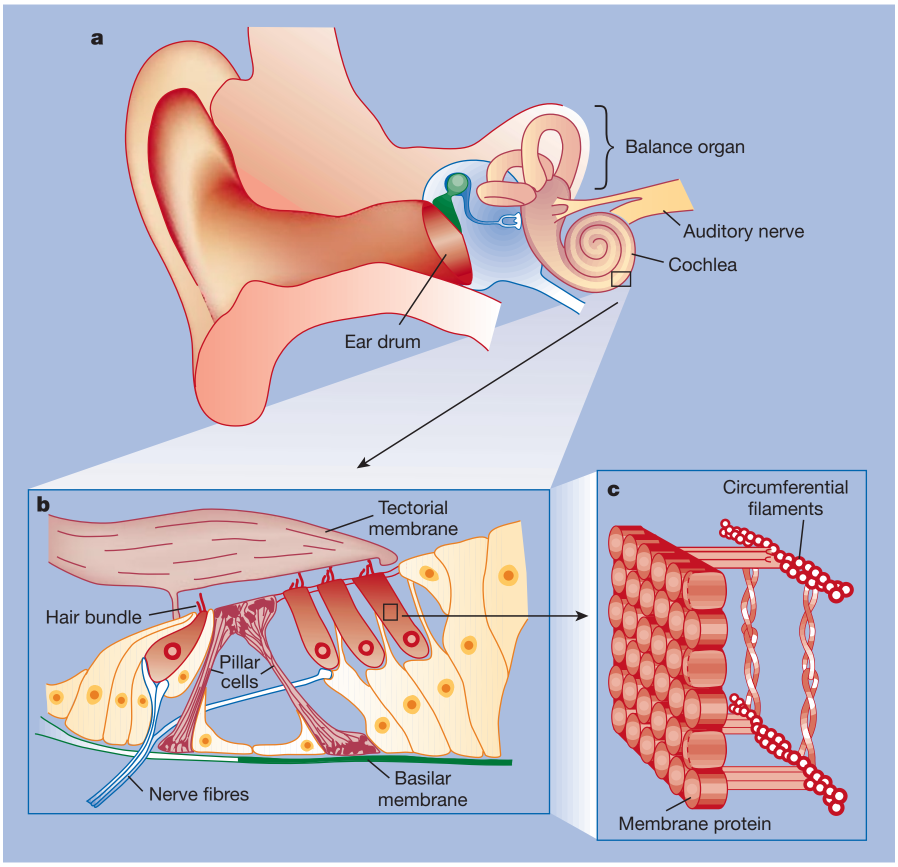

Figure 1 **How we hear.** a, **The cochlea. Sound enters the outer ear canal, vibrates the eardrum and is transmitted to the cochlea by the middle ear bones.** b, **A transverse section through the organ of Corti. Inside the cochlea, the organ of Corti sits upon the basilar membrane. Its surface is covered by another membranous structure, the tectorial membrane. Vibration of the basilar membrane leads to lateral displacements of the mechanosensory bundles on the hair cells (coloured orange). Inner hair cells form a row to one side (the left side here) of two rows of specialized supporting cells (pillar cells); outer hair cells form several rows on the other side. Inner hair cells are connected mainly to afferent nerve fibres and so are responsible for sending sensory information to the brain. Outer hair cells are connected to relatively few afferent fibres and are located above the most flexible region of the basilar membrane, where they can more easily influence its mechanical responses.** c, **The plasma membrane of outer hair cells contains a high density of membrane proteins embedded within the lipid layer. It is connected to relatively stiff, circumferential filaments that are crosslinked by thinner, more compliant filaments. This submembrane skeleton helps to convert changes of membrane surface area into changes in cell length.**

NATURE

100 YEARS AGO

The Paris correspondent of the *Chemist and Druggist* states that science is represented at the Salon by several portraits of average merit. The best is that of Dr. Vaillard, head army surgeon and professor at the Val de Grace Military Hospital, where he is known to two or three generations of army pharmacists who have followed his lectures. Dr. Vaillard is of middle age, and is shown standing, in regimental dress, with the Cross of the Legion of Honour on his tunic. His left hand is leaning on a laboratory-bench, on which are a microscope and a variety of analytical appliances… One would like to see more of this class of picture, but must suppose artists find no market for them.

From *Nature* 10 May 1900.

50 YEARS AGO

In 1940 the first isotopes of the elements 93 (neptunium) and 94 (plutonium) were produced, and four years later the artificial creation of the elements 95 and 96 (americium and curium) was accomplished … Now from the Radiation Laboratory of the University of California comes the news that within the past few months the next two transuranic elements have been made and identified. The first announcement, released early in January of this year, concerned element 97. S. G. Thompson, A. Ghiorso and G. T. Seaborg, aided by a number of other physicists and chemists working under the auspices of the U.S. Atomic Energy Commission, had bombarded the isotope of element 95 (americium), of atomic weight 241, with 35-MeV. helium ions accelerated in the California 60-in. cyclotron and thereby obtained a nuclide with a half-life of 4.6 hr. and probable atomic weight 243. It decays by electron capture, with approximately 0.1 per cent α-branching; there seem to be three α-particle groups, that of 6.72 MeV. having the highest energy. The production of element 98, which has just been reported by the same three authors and K. Street, jun., was achieved in an analogous way. By irradiating the isotope of element 96 (curium) of atomic weight 242, in the same cyclotron with helium ions of the same energy, a new nuclide was formed which decays with a half-life of about 45 min., emitting α-particles of energy 7.1 MeV. The possible and, for theoretical reasons, likely decay by electron capture has not yet been observed. The atomic weight should be 244.

From *Nature* 13 May 1950.

© 2000 Macmillan Magazines Ltd