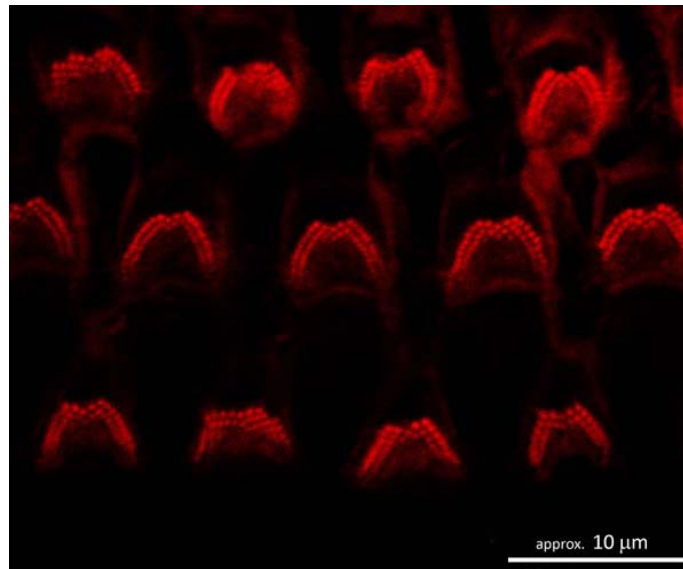
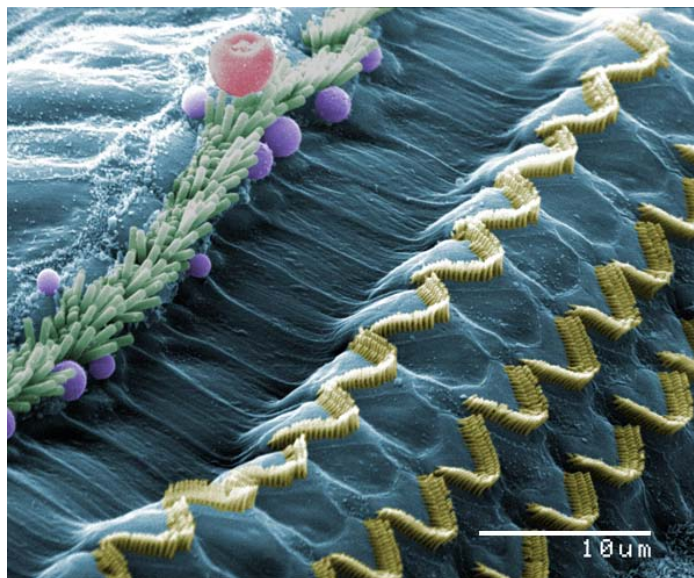


Hair cells of the inner ear

We use both light and electron microscopy to study biological structure and function. Hair cells are responsible for both hearing (via sound amplification and neural transmission) and balance within the ear of vertebrates. Here you can see the hair cells, within the organ of Corti in the cochlea of the inner ear, whose loss results in deafness and being hard-of-hearing. These cells can either be lost through genetic errors or exposure to excessive noise. This latter cause is now increasingly common, and unfortunately - once destroyed - hair cells do not regenerate.



Light micrograph of the outer hair cells stained with phalloidin, conjugated to Alexa 647, to label the actin in the hairs and imaged with a point-scanning Leica TCS-SP5 confocal microscope using the 633nm laser line.



The higher resolving power of the scanning electron microscope is obvious; this is a false-colour surface view of the hair cells, grouped into the classic three rows of outer hair cells (yellow) plus one row of inner hair cells (green) arrangement, arranged over the surface of the basilar membrane. The three rows of outer hair cells pre-amplify the sound, whilst the inner hair cells convert sound to an electrical signal so stimulating the auditory nerve. Outer hair cells are peculiar to mammals, and pre-amplification both extends the hearing range and, in humans, allows exquisite frequency discrimination, thus permitting development of speech and music. The upper tectorial membrane has been removed, exposing the hair cells. The red 'ball' is an erythrocyte; the purple spheres most likely artificial debris from preparing the sample.