Editorial Overview

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The vestibular system and auditory system utilize a common form of mechanosensitive hair cells located in the fluid-filled inner ear. Activation of these mechanoreceptors by appropriate stimuli triggers a cascade of neural events along distinctive pathways thereby providing the brain with the senses of balance and hearing. The review articles collected in this special issue summarize the latest progress of research in these two systems spanning from the dynamics of development to plasticity in adult circuitry. They also explore current advances in cellular mechanism, signal processing and clinical application. The first article by Lai et al. [pp 162–170] outlines the prenatal and postnatal developmental profiles of vestibular neural circuits. Emphasis is placed on the postnatal maturation of central vestibular neurons, including the role of glutamatergic transmission and the coding of gravity-related spatial information. The article of Newlands and Angelaki [pp 171–182] provides an overview on the compensatory processes of the primate oculomotor system following manipulations of the peripheral vestibular apparatus. Focus is placed on the plasticity of otolith/canal interaction and eye-head coordination especially during functional recovery associated with vestibular compensation. This article also probes into the spatial orientation function. Paterson et al. [pp 183–193] focus on the cellular mechanisms of vestibular compensation pertaining to the remodeling of circuitry and synaptic plasticity in the vestibular nucleus and cerebellum. Insights on the involvement of the neuroendocrine system in balance disorders are also presented. The article of Vidal et al. [pp 194–206] addresses the recovery of vestibulo-ocular reflexes and postural deficits during ves-

tibular compensation. Plastic changes in the membrane properties of medial vestibular neurons parallel the recovery of vestibulo-ocular reflexes. The correlation of findings from animal studies with observations from vestibular patients offers a perspective on the clinical impact of vestibular disorders. Curthoys' [pp 207–214] article on vestibular responses to sound strategically bridges the foregoing articles on the vestibular system and the following three articles covering the auditory system. Evidence derived from animal studies which revealed the activation of vestibular receptors by sound has been translated into a new clinical test of human vestibular function using sound as the test stimulus. Malmierca's [pp 215–229] article summarizes the anatomical and physiological features of the inferior colliculus. This article has put emphasis on the convergence of ascending and descending information. The article of Huetz and Edeline [pp 230–238] focuses on the thalamocortical system. It addresses the information relay system from the perspective of receptive field dynamics and the rate of signal transmission. The article by Zhang et al. [pp 239–248] summarizes the thalamocortical and corticothalamic interaction in the auditory system. They propose a model in which the corticothalamic system serves as the executive filter for selective attention. The trend of future research in systems neuroscience is highlighted by the last three articles in which specific relay stations are explored as integral parts of a sensory system. With review articles on cognate disciplines in vestibular and auditory research, this special issue portrays the synergism that is necessary for future consolidation of vestibulo-auditory neurobiology.