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Voltage-gated ion channels are traditionally thought to solely regulate the electrical impulses that carry signals throughout the nervous system. But now it seems that these vital components of cell membranes lead double lives. In recent years, intriguing findings have emerged to show that voltage-gated ion channels have active roles in diverse biological functions — including participating in intracellular signalling, working as cell adhesion molecules and components of the cytoskeleton, and regulating the expression of certain genes — in the absence of ion conduction. These non-conducting functions of voltage-gated ion channels are the focus of Leonard Kaczmarek's review (page 761), in which he draws together a diverse literature and provides some fascinating insights into the molecular mechanisms involved. This field is still at an early stage, and it is hoped that future work will shed more light on the biological significance of these varied functions and the links between the many subtypes of ion channels and signalling pathways.

Such progress in neuroscience would not be possible without the inspiring work of Santiago Ramón y Cajal, who provided the foundations for much of our understanding of the functional architecture of the nervous system. This year marks the 100th anniversary since Cajal, together with Camillo Golgi, received the Nobel Prize for Physiology or Medicine. To celebrate this, we are delighted to present an Essay article by Javier DeFelipe (page 811), in which he explores a less well-known aspect of Cajal's work: his observations and theories on neuronal plasticity and mental processes. These ideas provided the groundwork for our current understanding of neuronal plasticity and many remain valid today.

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