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Sommario/riassunto	The appropriate function of the nervous system relies on precise patterns of connectivity among hundreds to billions of neurons across different biological systems. Evolutionary conserved patterns of neural circuit organization and connectivity between morphologically and functionally diverse sets of neurons emerge from a remarkably robust set of genetic blueprints, uniquely defining circuits responsible for planning and execution of behavioral repertoires. Although it is well established that individual neurons represent the elemental building blocks of the brain, understanding the architecture of neural circuits and how neurons functionally “wire up” through synapses, remains one of biology’s major challenges. Our current understanding of how interconnected neuronal populations produce perception, memory, and behavior remains nascent. To unravel the details of complex nervous system function, we must consider not only the morphological and physiological properties of individual neurons, but also the structure and function of connections formed between different cell types.Recent advances in molecular genetic, viral engineering, and imaging technologies allow to precisely label, manipulate, and map neural circuits, revealing previously unattainable details about the cellular

morphologies and subcellular structures that are unique to the different types of neurons that make up the brain. Examples include newly engineered tools for chemical/genetic labeling and multi-photon imaging, which allow examining the functional connectivity between selective populations of neurons. Another remarkable advance in imaging technologies has been the development of array tomography, a high-resolution immunofluorescence technique that allows the molecular characterization of synapses alongside quantitative analysis of spatial relationships between multiple synaptic components in the same volume of tissue. Now, with such tools in hand, we are able to address long-standing unanswered questions about the structural and functional features of neural circuits.This Research Topic broadly covers studies using state-of-the-art genetic approaches and optical tools to map and explore the functional architecture of neural circuits across various biological systems. Contributions should be made by neuroscientists interested in understanding the structure and function of neural circuits at any level, from micro- to macrocircuits.