Electrical signaling plays a fundamental role in biology: our neurons communicate with little electrical blips, our heart is paced by an electrical wave, and every cell in our body powers part of its metabolism from electrical energy in mitochondria. Yet just by looking at a cell, we cannot see these electrical signals. I will describe how we engineered a gene from a Dead Sea microorganism to act as a voltage indicator, to convert bioelectric signals into flashes of fluorescence. We are using this voltage indicator to study bioelectric phenomena throughout life, and seeing many surprising effects. By expressing this indicator in human stem cell-derived models of neurodegenerative disease, we are gaining insights into disease mechanisms and possible treatments. This research is only possible because some ecologists went looking in the muck by the Dead Sea thirty years ago.

In 2007 Technology Review Magazine named Cohen one of the top 35 US technological innovators under the age of 35 and in 2012 Popular Science named him one of their “Brilliant Ten” top young scientists. In 2013 he became an investigator with the Howard Hughes Medical Institute (HHMI). He has published over fifty peer-reviewed publications and has five patents issued or pending.