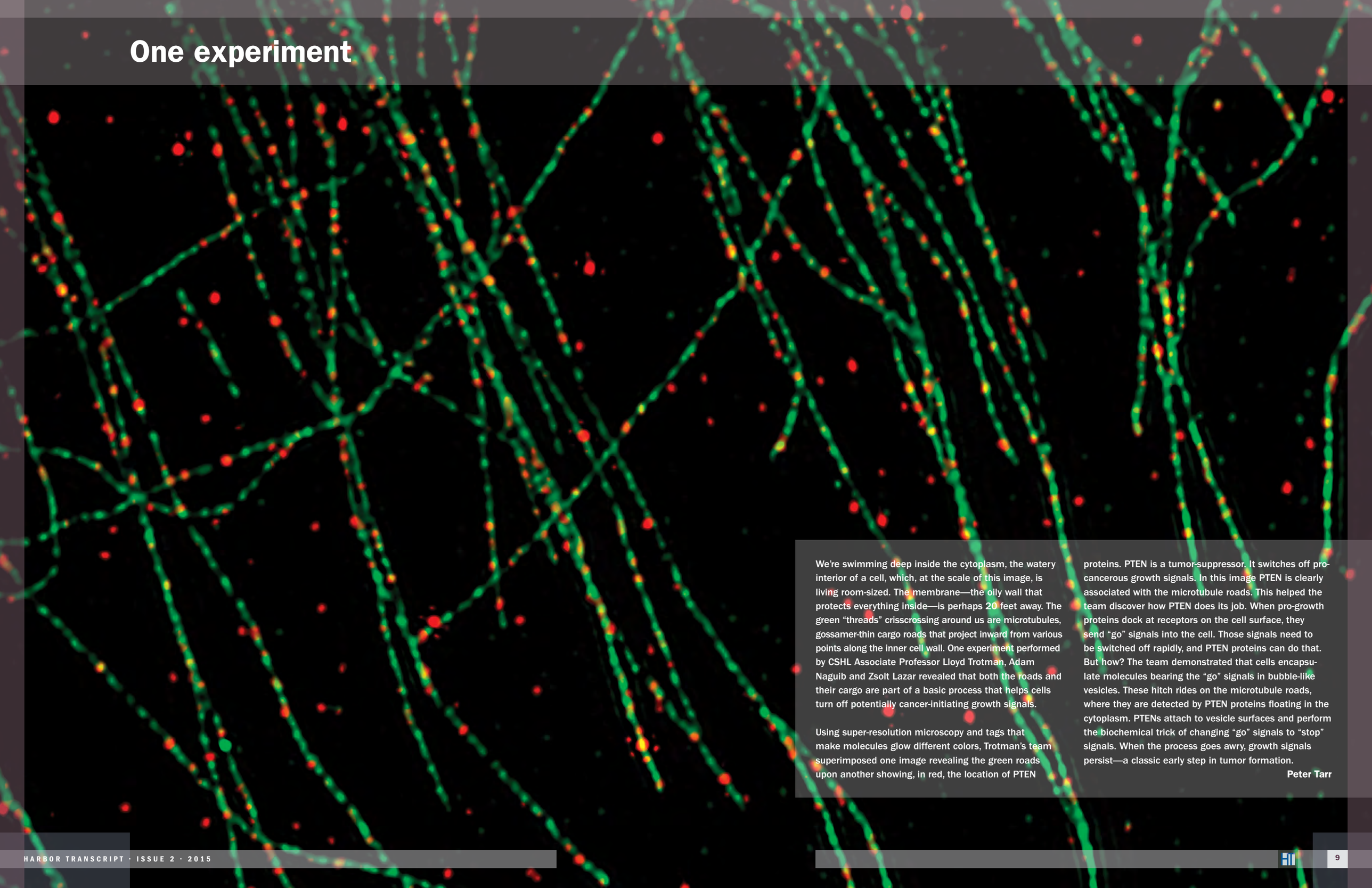
One experiment



We're swimming deep inside the cytoplasm, the watery interior of a cell, which, at the scale of this image, is living room-sized. The membrane—the oily wall that protects everything inside—is perhaps 20 feet away. The green "threads" crisscrossing around us are microtubules, gossamer-thin cargo roads that project inward from various points along the inner cell wall. One experiment performed by CSHL Associate Professor Lloyd Trotman, Adam Naguib and Zsolt Lazar revealed that both the roads and their cargo are part of a basic process that helps cells turn off potentially cancer-initiating growth signals.

Using super-resolution microscopy and tags that make molecules glow different colors, Trotman's team superimposed one image revealing the green roads upon another showing, in red, the location of PTEN proteins. PTEN is a tumor-suppressor. It switches off pro-cancerous growth signals. In this image PTEN is clearly associated with the microtubule roads. This helped the team discover how PTEN does its job. When pro-growth proteins dock at receptors on the cell surface, they send "go" signals into the cell. Those signals need to be switched off rapidly, and PTEN proteins can do that. But how? The team demonstrated that cells encapsulate molecules bearing the "go" signals in bubble-like vesicles. These hitch rides on the microtubule roads, where they are detected by PTEN proteins floating in the cytoplasm. PTENs attach to vesicle surfaces and perform the biochemical trick of changing "go" signals to "stop" signals. When the process goes awry, growth signals persist—a classic early step in tumor formation.

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