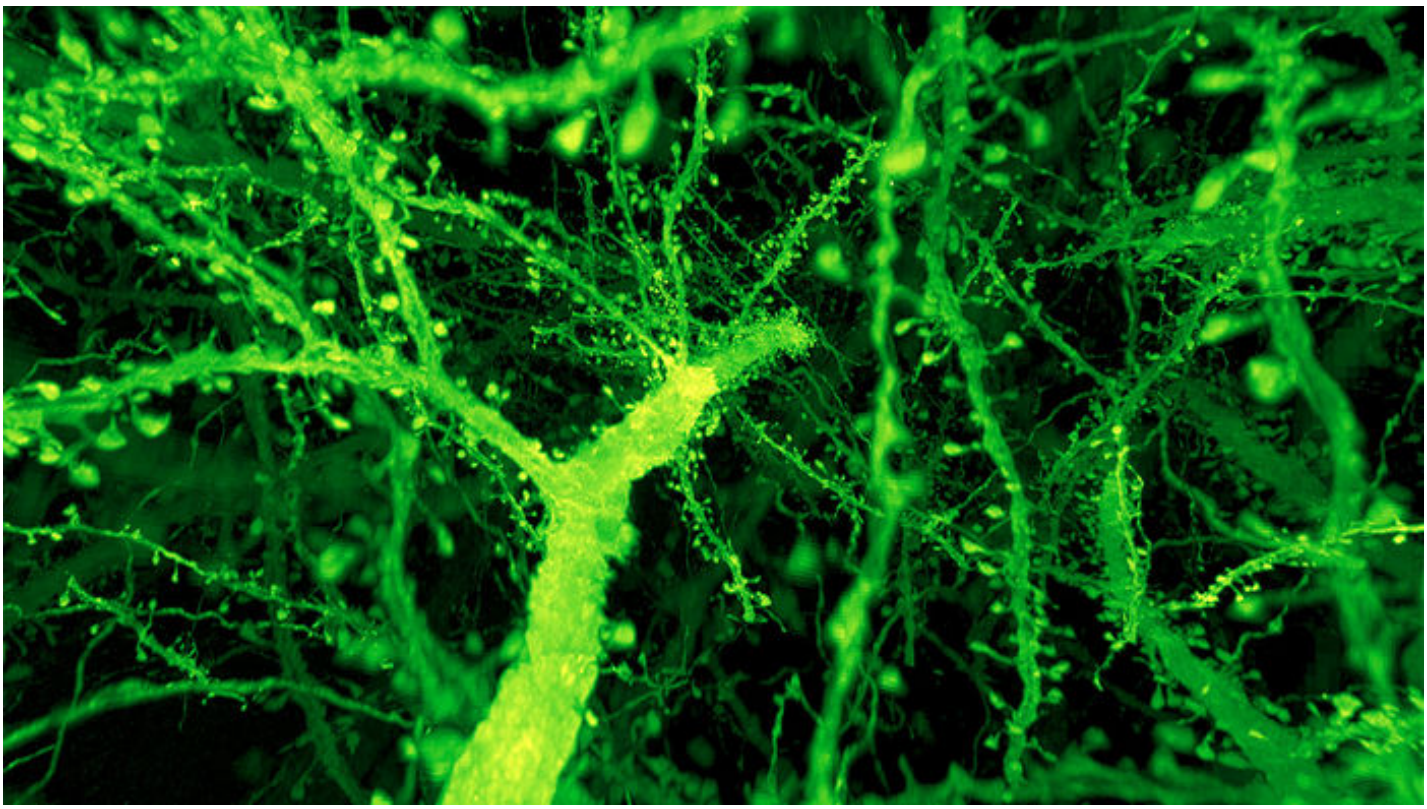

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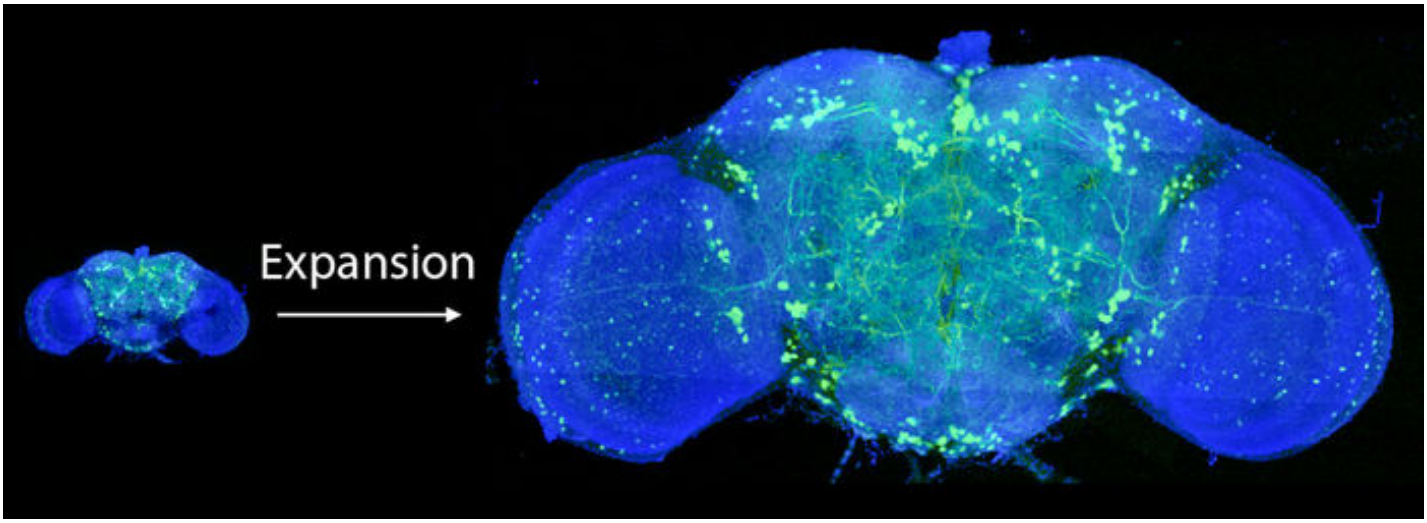
called **expansion microscopy**, scientists have been doing just that: labeling neurons of interest and tracing their thinnest tendrils to chart their connections. But the process, which infuses a piece of brain tissue with a gel that swells up to enlarge the details, dramatically increases the time it takes to image that tissue. And as a microscope beam images parts of this thick sample from top to bottom, it can "burn out" the uor escent tags attached to proteins that help identify the neurons, making deeper parts of the sample completely dark.

In a new study, researchers present a solution: combining that expansion process with an instrument called a lattice light-sheet microscope, which sweeps an ultrathin sheet of light through the sample. Because this microscope can linger longer on any area with less intense light than other microscopes, the uor escence is less likely to burn out and obscure parts of the image—which means that sharp, intricate details, such as the spines on mouse neurons (shown in green, above) can emerge. And by capturing a whole plane at once instead of a set of points, this microscope **worked through an entire y br ain (below) in 62.5 hours**, roughly seven times faster than the fastest microscope used in such high-resolution imaging to date, the team reports today in *Science*.



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Thanks to sophisticated computational tools that stitch thousands of 3D sections together, the researchers showed they could capture large areas of brain and then **zoom in at high resolution**. The approach should make it easier to study how circuits of interacting neurons across the brain drive certain behaviors, and how that circuitry varies across lots of individuals, between sexes, or over the course of development.

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