TOOLBOX

Interactive atlas reveals zebrafish brain circuits in 3D

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A new online tool maps the shape and location of neurons in the larval zebrafish brain[1].

Researchers have used the tool to create a **brain atlas** covering 2 percent of the fish's neuronal wiring. As the atlas grows, scientists could use it to connect neuronal circuits to zebrafish behaviors and to compare the wiring of typical zebrafish with that of fish that show abnormal behaviors.

Zebrafish may be good models for brain conditions such as autism. The animals have a rich repertoire of **social behaviors**, and their brains are strikingly similar to those of mammals.

The researchers created the atlas in stages. They first mapped the **synapses** (neuronal junctions) by tagging synapsin, a synapse protein, with fluorescent antibodies. They took pictures of the glowing synapses of 12 zebrafish brains and merged the images into one. The result is a template onto which the researchers can overlay neuronal connections.

The researchers then used a genetic technique that labels one to a few neurons in zebrafish larvae with a fluorescent protein, causing these neurons to glow. They repeated the experiment in 1,278 larvae, each time dissolving most of the surrounding brain tissue to better see the neurons. These techniques revealed the paths of 1,709 individual neurons, which the researchers added to the map.

Users can view the resulting atlas from multiple perspectives: as a 3D whole, in slices, by brain region or by expression patterns of particular genes.

The researchers tested the resolution of the atlas by looking at a brain region called the tectum. Studies in larger fish show that nerves carrying visual and nonvisual information connect with different parts of the tectum. Using the atlas, the researchers confirmed that the same is true in zebrafish, they reported 3 July in *Neuron*.

The researchers designed the atlas as collaborative project so that other teams can help fill in the gaps.

REFERENCES:

1. Kunst M. *et al*. *Neuron* **103**, 21-38.e5 (2019) **PubMed**