NEWS

Map of fly brain lights up millions of connections

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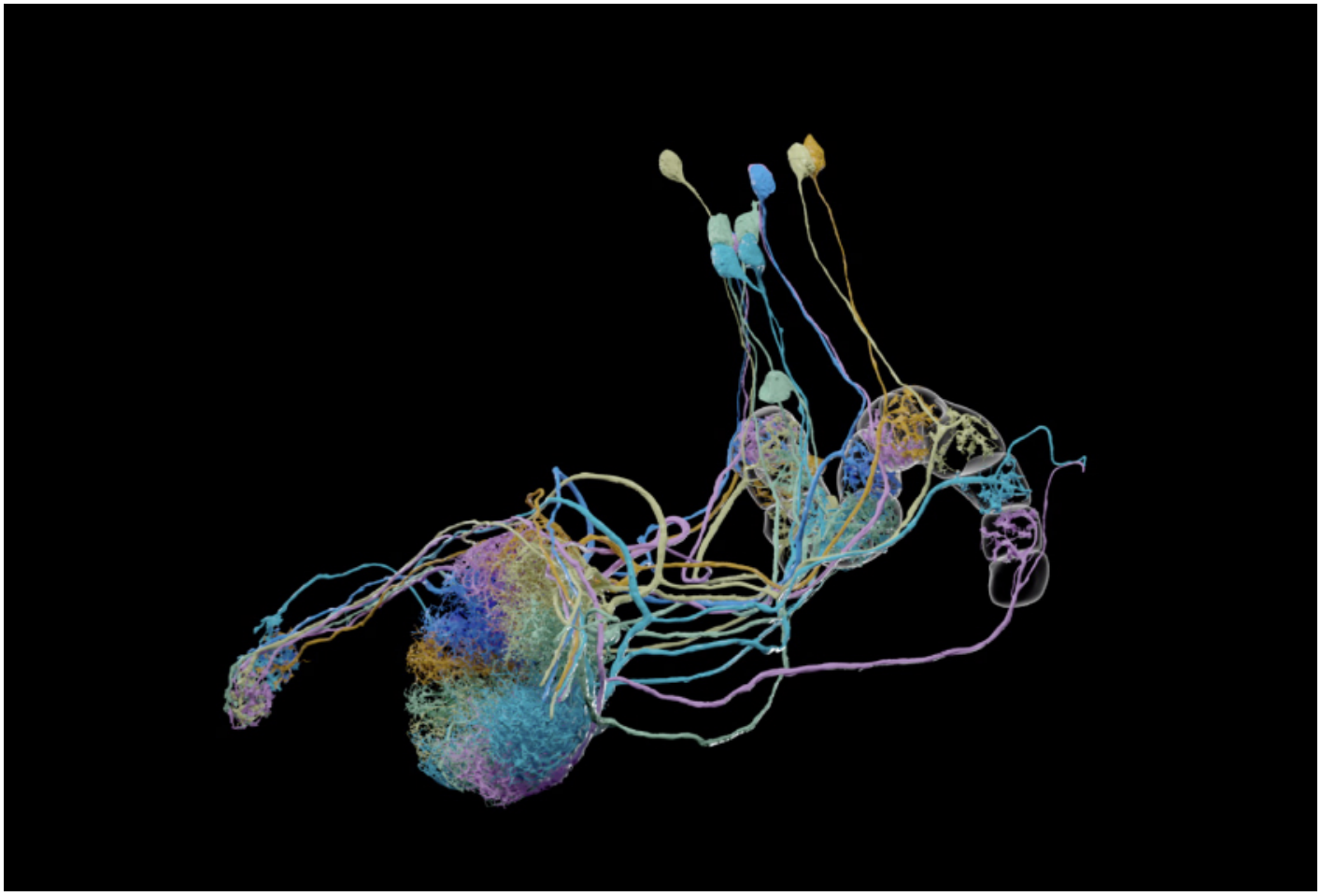

Bright eyes: Researchers mapped the region of the fruit fly brain responsible for learning and vision.

Neuron tapestry: Images are woven together and colorized to trace the paths of individual neurons.

Color me pretty: Colors distinguish individual neurons in a slice of the fruit fly brain.

Space flight: A 3D reconstruction shows a brain region involved in navigation.

Connect the dots: Mapping the neurons in 3D shows how they connect with each other.

Cell signal: Colors highlight ‘ring’ neurons involved in fruit fly navigation.

Visual check: Proofreaders catch mistakes and fill in what computer algorithms miss.

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A new wiring diagram of the fruit fly brain is the most complex ever created[1]. The ‘connectome’ maps more than 20 million connections, or **synapses**, among 25,000 of the fly’s 100,000 neurons.

Even though the map covers only a portion of the fly brain, it marks a significant increase in complexity over the **only complete connectome** — which details the 302 neurons and 7,000 synapses of the tiny roundworm *Caenorhabditis elegans*.

To create the fly map, the researchers scanned thin slices of brain tissue using an electron microscope. Using powerful algorithms, they reconstructed each neuron’s location and connections.

Unlike *C. elegans*, fruit flies have complex behaviors, such as learning, memory and the ability to navigate their environments. They also have a brain small enough to diagram in full at neuron-level detail, says lead researcher **Gerald Rubin**, executive director of the Howard Hughes Medical Institute’s Janelia Research Campus in Ashburn, Virginia.

“The fly is sort of a sweet spot between being simple enough that we might understand it, but complex enough to have all these fascinating behaviors that we have no idea how any brain

controls," Rubin says.

Rubin says he hopes neuroscientists will use the map to study fruit fly behaviors. Using techniques similar to those his team used, researchers could build more complete connectomes of the human brain to reveal insights into autism and other brain-related conditions.

REFERENCES:

1. Shan Xu C. *et al. bioRxiv* 10.1101/2020.01.21.911859 (2020) **Abstract**