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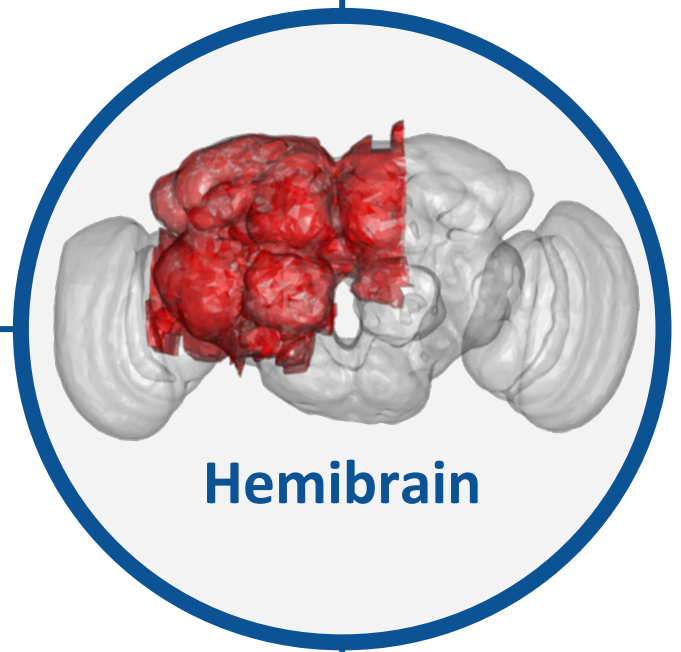
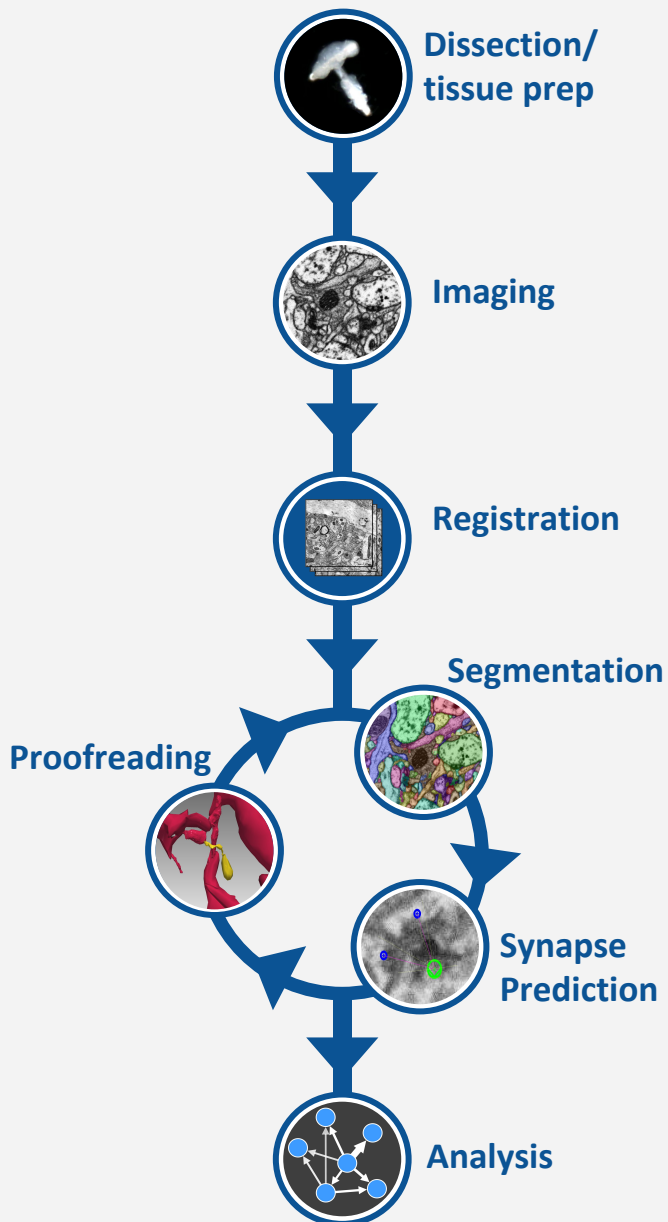
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Overview. The Hemibrain is the largest drosophila connectome to date, encompassing a significant portion of the fly brain.

The Connectome Workflow. Electron microscopy data is acquired and registered... over x years



Neurons: **20,000**
Postsynaptic Sites: **60 million**
Presynaptic Sites: **4 million**
Proofreading hours:
Number of compartments: **109**
Left hemisphere:
Right hemisphere:
Central:

Body Statuses



A **body** is generated by automatically predicting cell membranes in electron microscopy images of brain tissue. Bodies are manual proofread to correct errors made by the automatic segmentation algorithm and then assigned a **status** depending on their size/completeness. Statuses can be assigned automatically or manually by proofreaders and biologists.

Status	Description
Traced	A body more complete than 'Roughly traced' (usually traced by a lab) and validated by a biological expert (Shin-ya, Kazunori)
Roughly traced	Body's high-level shape correct, may also be named, and validated by a biological expert (Shin-ya, Kazunori)
Leaves	A body with a significant portion that leaves the volume
Orphan	A body that can't be traced and does not exit the volume
Orphan Hotknife	A body that can't be traced through a hotknife and does not exit the volume
Orphan Artifact	A body that can't be traced due to an imaging artifact and does not exit the volume
0.5 assign	Small body that is within the set required for a 0.5 connectome - Has approximately ≥ 2 T-bars or ≥ 10 PSDs (starting bodies for OL and focused workflow)
Unimportant	A body irrelevant to reconstructing neurons and the connectome such as glial profiles and out-of-bounds bodies

Neuron Names



Nomenclature. The nomenclature of neurons names... To include information on how names were chosen when there were multiple names in literature (pick the shortest one) how soma tract names were created, how input output ROI names were chosen. See here for more information (link to paper)...

Regions of Interest (ROI)



Overview. An ROI is a volumetric area of the dataset often marked by the boundaries of a neuropil, synaptically dense brain region. The hemibrain dataset also contains ROIs marked by fiber bundles, a collection of neuronal projections with a low density of synapses. The hemibrain dataset contains 109 manually annotated ROIs. For more information about creating ROIs, see [section x of the paper *Paper Title*](#).

Organization. ROIs are organized into supercategories and may contain subregions. For hierarchical organization and abbreviations see the [ROI explorer](#).

Nomenclature. The nomenclature of ROIs in the hemibrain follow [“A Systematic Nomenclature for the Insect Brain”](#). For more information, see



OL - Optic Lobe

ME - Medulla
AME - Accessory Medulla
LO - Lobula
LOP - Lobula Plate

MB - Mushroom Body (L/R)

CA - Calyx (L/R)
IACA - Lateral Accessory Calyx
dACA - Dorsal Accessory Calyx
vACA - Ventral Accessory Calyx
PED - Pedunculus
Vertical Lobe (VL)
aL - Alpha Lobe (L/R)
a'L - Alpha Prime Lobe (L/R)
Medial Lobe (ML)
bL - Beta Lobe (L/R)
b'L - Beta Prime Lobe (L/R)
gL - Gamma Lobe (L/R)

CX - Central Complex

Central Body
FB - Fan Shaped Body
FB-column3
FB07
FB08v
AB - Asymmetric Body (L/R)
EB - Epsilloid Body (no link)
PB - Protocerebral Bridge (L/R 1-9)
NO - Noduli (L/R 1-3)

LX - Lateral Complex

BU - Bulb (L/R)
LAL - Lateral Accessory Lobe (L/R)
GA - Gall

VLNP - Ventrolateral Neuropils

AOTU - Anterior Optic Tubercle
AVLP - Anterior Ventrolateral Protocerebrum
PVLP - Posterior Ventrolateral Protocerebrum
PLP - Posteriorlateral Protocerebrum
WED - Wedge

LH - Lateral Horn

SNP - Superior Neuropils

SLP - Superior Lateral Protocerebrum
SIP - Superior Intermediate Protocerebrum (L/R)
SMP - Superior Medial Protocerebrum (L/R)

INP - Inferior Neuropils

CRE - Crepine (L/R)
RUB - Rubus (L/R)
ROB - Round Body (same as ^)
SCL - Superior Clamp (L/R)
ICL - Inferior Clamp (L/R)
IB - Inferior Bridge
ATL - Antler (L/R)

AL - Antennal Lobe (L/R)

AL-DC3 - Antennal Lobe DC3 (glomerulus)

VMNP - Ventromedial Neuropils

VES - Vest (L/R)
EPA - Epaulette (L/R)
GOR - Gorget (L/R)
SPS - Superior Posterior Slope (L/R)
IPS - Inferior Posterior Slope

PENP - Periesophageal Neuropils

SAD - Saddle
AMMC - Antennal Mechanosensory and Motor Center
FLA - Flange
CAN - Cantle
PRW - Prow

GNG - Gnathal Ganglia

Tracts

AOT - Anterior Optic Tract
POC - Posterior Optic Commissure
mALT - Medial antennal Lobe Tracts (L/R)
GC - Great Commissure
GF - Giant Fiber (neuron)

Biology Terms



Neuron Anatomy

Dendrite - A branched extension of a nerve cell, along which impulses from other cells are received.

Axon - A branched extension of a nerve cell along which impulses are conducted to other cells.

Arbor - A branch of a neuron.

Neurite / neuronal fiber -

Neuronal projection -

Synapse - Structure that permits one neuron to pass an electrical or chemical signal to one or more neurons. Can send electrical or chemical signals. (*dataset here records only chemical synapses*) Chemical Synapses contain a presynaptic site, a postsynaptic site, a synaptic cleft between the two, that helps to release the signal, a synaptic cleft that is a gap between the two neurons that is the site of electrical or chemical transmission, and a postsynaptic protein that receives the signal.

Presynaptic neuron - The neuron that sends the signal in a given synapse

Postsynaptic neuron - The neuron that receives the signal in a given synapse

Receptor - A membrane protein on the postsynaptic neuron in a chemical synapse that binds to the neurotransmitter and creates an effect in the postsynaptic neurons

Vesicle - A phospholipid circular container in a presynaptic neuron that contains neurotransmitter

T-bar - Presynaptic membrane protein in drosophila that allows vesicles to release their neurotransmitter into the synaptic cleft

PSD - Stands for the postsynaptic density. Area on the membrane of the postsynaptic neuron that is dense with proteins. The EM image of a PSD shows a dense, dark membrane.

Synaptic cleft - The space between neurons that synapse with each other through which electrical or Neurotransmitter - A molecule that is the physical medium of the signal sent out by the presynaptic neuron in a chemical synapse

Electrical synapse - *This type of synapse is not recorded in these datasets.* A mechanical and electrically conductive link between two neighboring neurons that is formed at a narrow gap between pre and postsynaptic neurons that is known as the gap junction. Here there is a connection between intercellular fluid of two neurons through hydrophilic channels that can open and close.

Dense core vesicle - A special type of vesicle that contains neurotransmitter. Does not need a t-bar to release the neurotransmitter to neighboring cells (unsure of this definition). Contain neuropeptides, dopamine and neuromodulators such as dopamine and serotonin. (uncertain about a lot of this)

Claw - Claw link branching structures with many PSD's that wrap around the bouton of another neuron

Bouton - A ballooning structure filled with vesicles and t-bars on a neuron. Sends information to many neurons, some of which form claws around the bouton.

Cell body fibers -

Membrane - The thin layer of tissue that acts as the boundary and lining of a cell. In neurons, this membrane is a bilayer of lipid molecules with many proteins embedded inside.

Axes and planes - Dorsal, ventral, anterior, posterior, rostral, caudal. (add image)

Contralateral - A brain region that crosses from one hemisphere to the other.

Ipsilateral - A brain region that stays in one hemisphere and does not cross into the other.
medial, mediolateral, and lateral

Medial - Referring to the area of the brain that is near the center of the two hemispheres of the brain.

Projection neuron - Neurons whose axons extend from one area of the brain to another.

Local neuron/interneuron - Neurons that do not connect far regions of the brain. Interneuron - a neuron that serves as a connection bridge of two target neurons / ROIs (While working in neutu/neuprint, I have been using the term local neuron to refer to neurons that stay in the same ROI or in adjacent ROIs, and interneuron as a neuron that serves as a bridge between two other neurons by connecting with a strong weight to both. These two definitions are not the same, but wikipedia lists them as synonyms)

Biology Terms



Sections of the Brain

Connectome - A comprehensive map of all the neurons and synapses within an organism's nervous system. It may be thought of as a wiring diagram.

Neuropil - Any area in the nervous system composed of mostly axons, dendrites, and glial cell processes that forms a synaptically dense region containing a low number of cell bodies. (add examples of what is a neuropil - is an ROI a neuropil?)

ROI - Region of interest. Can represent level 1, 2, or 3 neuropils, or a fiber bundle.

Supercategories - (Level 1 neuropil) Large neuropil blocks that can be further partitioned into smaller areas. No overlap between level 1 neuropils.

Unit neuropils - (Level 2 neuropil) Subdivisions of neuropil supercategories.

Subregions - (Level 3 neuropil) Subdivisions of unit neuropils.

Ganglia - A structure containing a number of nerve cell bodies, and often forming a swelling on a nerve fiber

Glomeruli - Clusters of nerve endings

Tract - A collection of fibers that travel together from one part of the brain to another.

Fascicles - A tract in the PNS?

Fiber bundles - A collection of fibers that travel together from one part of the brain to another. (is this in the brain or in the pns? Synonym of tract?)

Commissure - A band of nerve tissue that crosses from one side of the brain to the other. Connects two regions contralaterally

Neuromere - Transient segment of the developing brain.

Cell body layer - The layer on the outside of the fly brain that contains cell bodies

Neural circuits - A population of neurons interconnected by synapses to carry out a specific function when activated.

Glia - *This type of cell is not recorded in this dataset* Non-neuronal cells in the nervous system that maintain homeostasis and provides support and protection for neurons. (something about glial boundaries separating regions of the brain?)

Clonally associated groups of neurons -

Cerebral ganglia - (is this in the hemibrain?)

Gnathal ganglia - (is this in the hemibrain?)

Hemisphere - The two halves of the brain representing the right and left side. The brain is roughly symmetrical across these two hemispheres.

Drosophila melanogaster - The most commonly used species in insect neurobiology, and the species from whence all data in neuprint came.

Arthropod - An arthropod is an invertebrate animal having an exoskeleton, a segmented body, and paired jointed appendages. Arthropods form the phylum Euarthropoda, which includes insects, arachnids, myriapods, and crustaceans.

Gal4/split gal4 - (I think it would be good to have the janelia split gal4 light page linked on neuprint)

Driver -

EM - Electron Microscope or Electron Microscopy. An imaging technique for obtaining high resolution images of biological and non-biological specimens. It is used in biomedical research to investigate the detailed structure of tissues, cells, organelles and macromolecular complexes

Fib-sem - **Focused Ion Beam scanning electron microscope**. Technique used to image the data in hemibrain (what else?)
What imaging technique was used for the other datasets?