Anatomy notes for Mouse Atlas model EMA24

ANNOTATIONS ON ARBITRARY BOUNDARIES OF TISSUES:

GENERAL REMARKS:

The delineation of tissue boundaries is based on cell shape and configuration as seen in the original sections under a microscope. Where it was not possible to base boundaries on these grounds, we tried to look in other planes in the digital model. In a few cases, this led to an unambiguous boundary e.g. for the somites. However, in the majority of the cases in which boundaries could not be discerned in the original sections, decisions had to be based on other criteria than cell shape and configuration; we call these 'arbitrary' boundaries. Arbitrary boundaries are generally based on 3-dimensional shape, for example, division between the branchial arch and the rest of the embryo.

In this document we list the tissues with arbitrary boundaries and the grounds for each decision. The tissues are listed alphabetically in bold under the main components in the anatomy database. Tissues adjacent to the arbitrary boundary are displayed in italics if they are part of a different component in the anatomy database. Boundaries which, though based on cell shape and configuration, were doubtful are also listed.

EMA24, THEILER STAGE 13: Domain annotation table

The embryo as a whole		Painting was done on the basis of the original transverse sections, so the comments should be considered from that viewpoint.
	Lumina	Each intraembryonic lumen that forms is gradually included in intraembryonic space from the moment that the tissues that will enclose the lumen start to form. The lumen will thus be bordered by the shortest line (in the transverse section plane) between the tips of the tissues that will fuse to enclose it. An example is the lumen of the forming neural tube, others are the peritoneal cavity andgut. Lumina that will never be fully enclosed are not considered to be intraembryonic.
body cavity:	**Cavities of peritoneum, pericardio-peritoneal canals and pericardiac cavity:**	Division between these parts based on 3D shape and location of the **heart** and the **septum transversum**.
	Mesothelial lining of peritoneum, pericardio-peritoneal canals and pericardiac cavity:	Based on the boundaries of the cavities of these components.
branchial arches:		Boundary with **head mesenchyme** based on difference in grey level density of the two tissues.
	Surface epithelium and endodermal	Those parts of **gut** and **surface epithelium** that touch the **mesenchyme** of the **branchial arch**.

	lining of the branchial arch:	**Endoderm**: **endodermal lining** is that part of the gut lining the arch.
	Branchial pouches:	Separation from **gut** based on 3D shape only.
head-body division:	**Somites**	The first four visible **somites** are thought to be **occipital somites**. This assumes that the first, transient somite has disintegrated.
	Nervous tissue (future brain and future spinal cord):	Based on the division of future **brain** and future **spinal cord** according to our assessment of position in the embryo as a whole and the morphology of the **neural tube**. This boundary is approximate. Correlation with gene expression patterns and other data will be required to determine the true position of the 'head/body' boundary.
	Mesenchyme	Based on the division of the **somites** into head- and body somites.
heart:	**Cardiac jelly and endothelium of different parts of the heart:**	Boundaries designed to follow the boundaries of the walls of the **heart**, unless otherwise stated.
	Common atrium wall:	Boundary with **septum transversum** based on difference in cell compaction. Boundary with **mesothelial lining of pericardio-peritoneal canals** based on 3D shape and a possible slight difference in cell compaction. Boundary with **primitive ventricle** constructed by propagating the line connecting the **atrio-ventricular canal** and **atrio-ventricular groove** cranially.
	Endothelial lining:	Boundary with **sinus venosus**: Cranial end of **sinus venosus** ends where the lumen of the **common atrium** splits into two parts.
	Primitive ventriclewall:	Boundary with **outflow tract** constructed by extrapolating the **bulbo-ventricular groove** cranially.
	Outflow tract wall:	Boundary with **mesothelial lining of pericardiac cavity** defined by both the extension of **cardiac jelly** and 3D shape of the wall and **mesotheilial lining of pericardiac cavity**. Boundary with **bulbus cordis** based on 3D shape only
mesenchyme:	**Body mesenchyme:**	Those parts of the **body mesenchyme** that are not **paraxial, lateral plate or segmented (somites, intermediate mesoderm, nephrogenic cord, presumptive nephric duct).** Contains **sclerotome-derived** and **neural-crest-derived** cells.

	Intermediate mesenchyme:	Condensed mesenchyme between **somites** and **lateral plate mesenchyme**. Where it has differentiated into two parts, the medial part is labelled as **nephrogenic cord** and the lateral part as **presumptive nephric duct.** **Intermediate mesenchyme** may contain migrating **neural-crest-derived melanoblasts** and **somite-derived myoblasts**.
	Splanchnic / somatic, lateral plate mesenchyme:	Medial extension of the **splanchnopleure**- and **somatopleure-derived mesoderm** is defined by the extension of the **mesothelial lining of the peritoneum**. We have divided the **lateral plate mesenchyme** from the head mesenchyme at the mid level of the **pericardial-peritoneal canal**.
	Paraxial mesenchyme:	Mesenchyme medial to the **lateral plate mesenchyme,** caudal to the **somites** and rostral and lateral to the **primitive streak**.
	Intercellular space:	Those spaces between and around **somites** and **intermediate mesoderm** that may result from shrinkage during fixation.
	notochord:	We based the presence of a **notochord** on a distinctly different cellular organisation from the adjacent **future spinal cord**. If there is no different organisation of cells the area was defined as **primitive streak**. Boundary between **notochord** and **surrounding mesenchyme** was based on cell arrangement.
	somites:	Most caudal site of radial cell organisation on microscopic level defined as the **last-formed somite.**
Neural crest:	**Facio-acoustic and trigeminal neural crest:**	Separation from mesenchyme on the basis that the neural-crest-derived cells that form these **ganglia** are more compacted than the surrounding mesenchyme. Therefore, ganglia cells may be excluded and other head mesenchyme cells included or vice versa. **Neural crest cells** have not been painted within the branchial arches, because these could not be recognised morphologically.
Sensory organs:	**Optic vesicles:**	Separation from **future brain** based on 3D shape only.
vascular system:		All boundaries between different parts based on 3D shape only.