GUDMAP
GenitoUrinary Development Molecular Anatomy Project

www.gudmap.org

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About GUDMAP

The **GenitoUrinary Development Molecular Anatomy Project (GUDMAP)** is an open access online resource developed by a consortium of researchers working to provide the scientific and medical community with gene expression data, transgenic mice and tools to facilitate research and teaching. Initially GUDMAP focused on the murine urogenital system. Recently, GUDMAP has extended its efforts to include two new elements:

- **Nociceptive GUDMAP (nGUDMAP)** focuses on nociceptors and cell types associated with pain processing for the murine lower urinary tract and pelvic region.

- **Human GUDMAP (hGUDMAP)** extends the gene expression database to include data sets that annotate human bladder, urethra and kidney.

GUDMAP data includes: **Large-scale in-situ hybridisation screens**,   **3D OPT data, microarray gene expression data**   and   **sequencing data** of the developing mouse genitourinary (GU) system. Expression data are annotated using a **high-resolution ontology** specific to the developing GU system.

GUDMAP Data

Summary 'gene-strip' (below) provides an overview of expression data available for each gene. Clickable links connect to in-situ data & images, disease/ phenotype associations and microarraydata.

Database Statistics	23-Oct-2015	
Assay Type	Entries	Genes
All In Situ Hybridisation (ISH):	10766	3692
Wholemount ISH (WISH):	7352	2896
Section ISH (SISH):	3414	1437
OPT ISH:	64	32
Immunohistochemistry (IHC):	125	31
Transgenic Reporters:	115	37
Microarray:	461	-
Sequencing:	246	-

Example of GUDMAP In-Situ Entry (GUDMAP:20862), displaying images (above) and expression mapped on anatomy ontology (right).
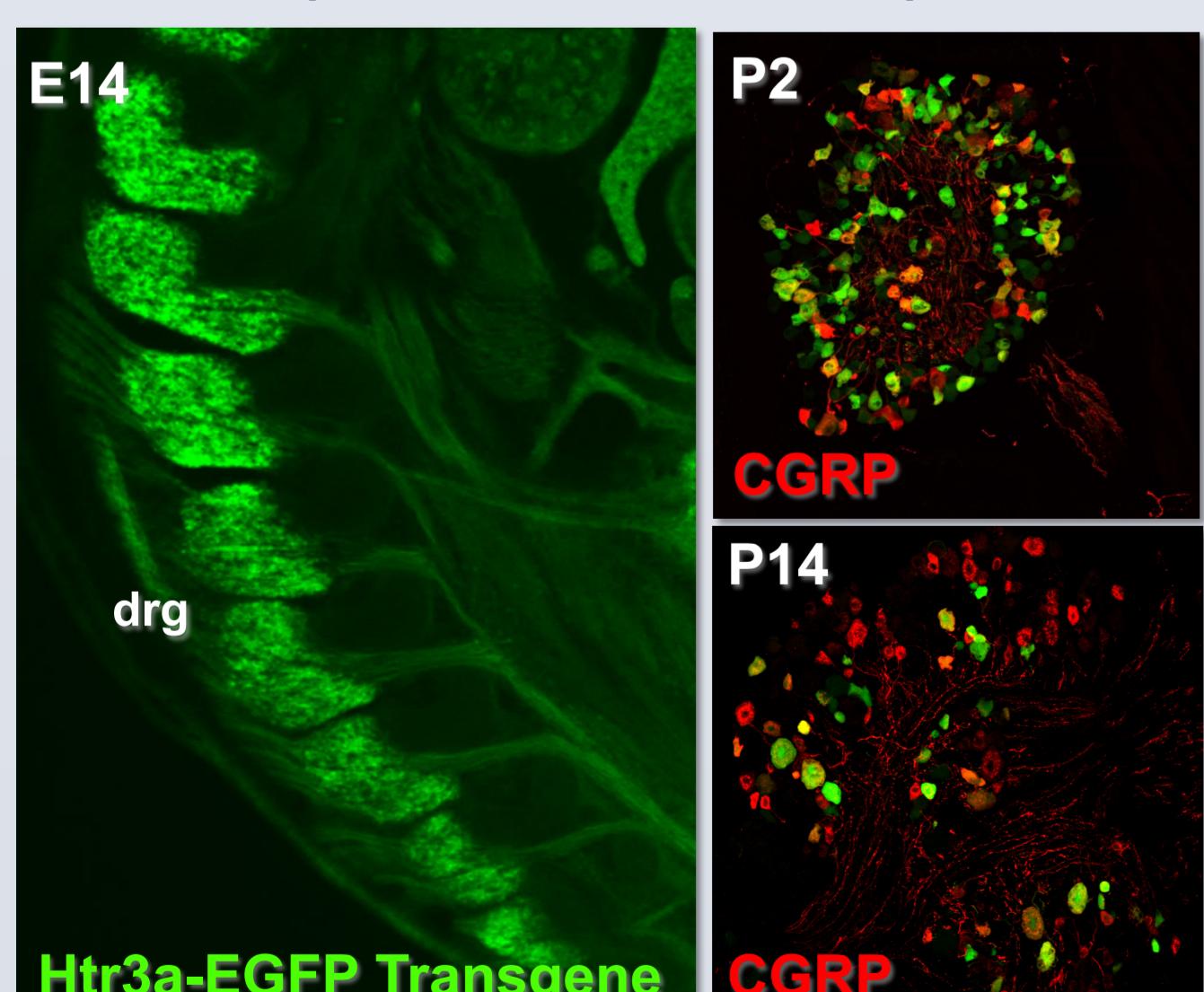
OPT 3D Atlas of Gene Expresssion in Developing Genital Tubercle and Urethra (M. Cohn Lab)

Anatomical Models   In situ Hybridization   Gene Expression Mapped onto Models
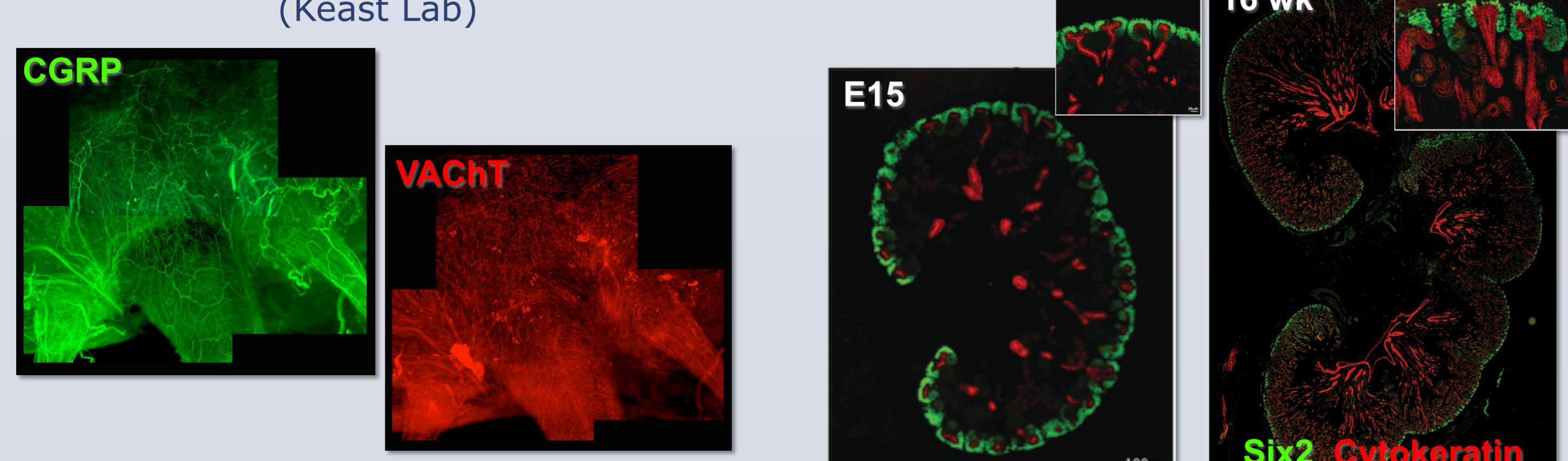
Nociceptive GUDMAP "nGUDMAP"

Developing DRG Immunohistochemistry (Southard-Smith Lab)

E14   drg   Htr3a-EGFP Transgene

P2   CGRP

P14   CGRP
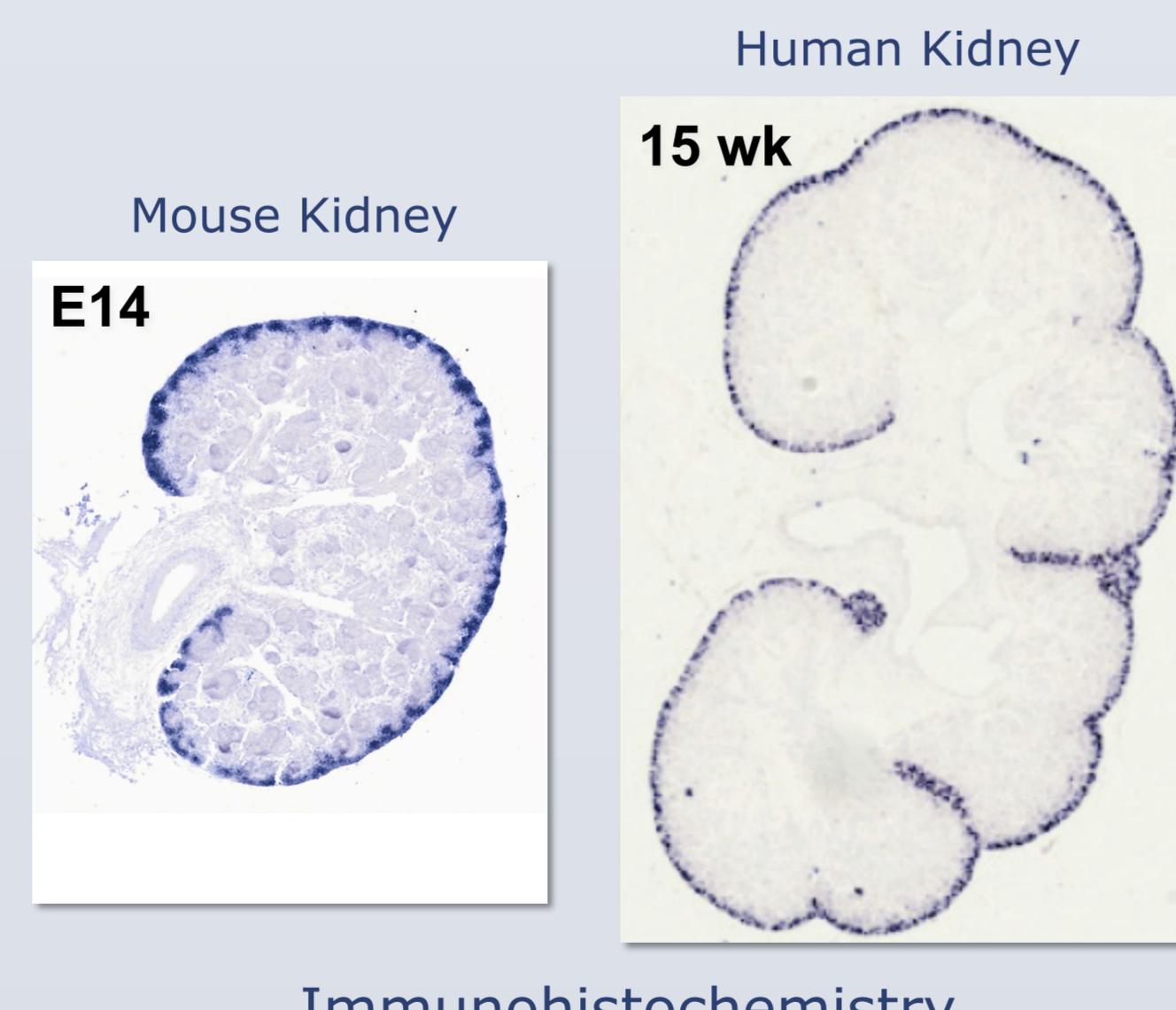
Adult   LUT   Immunohistochemistry (Keast Lab)

CGRP

VAChT
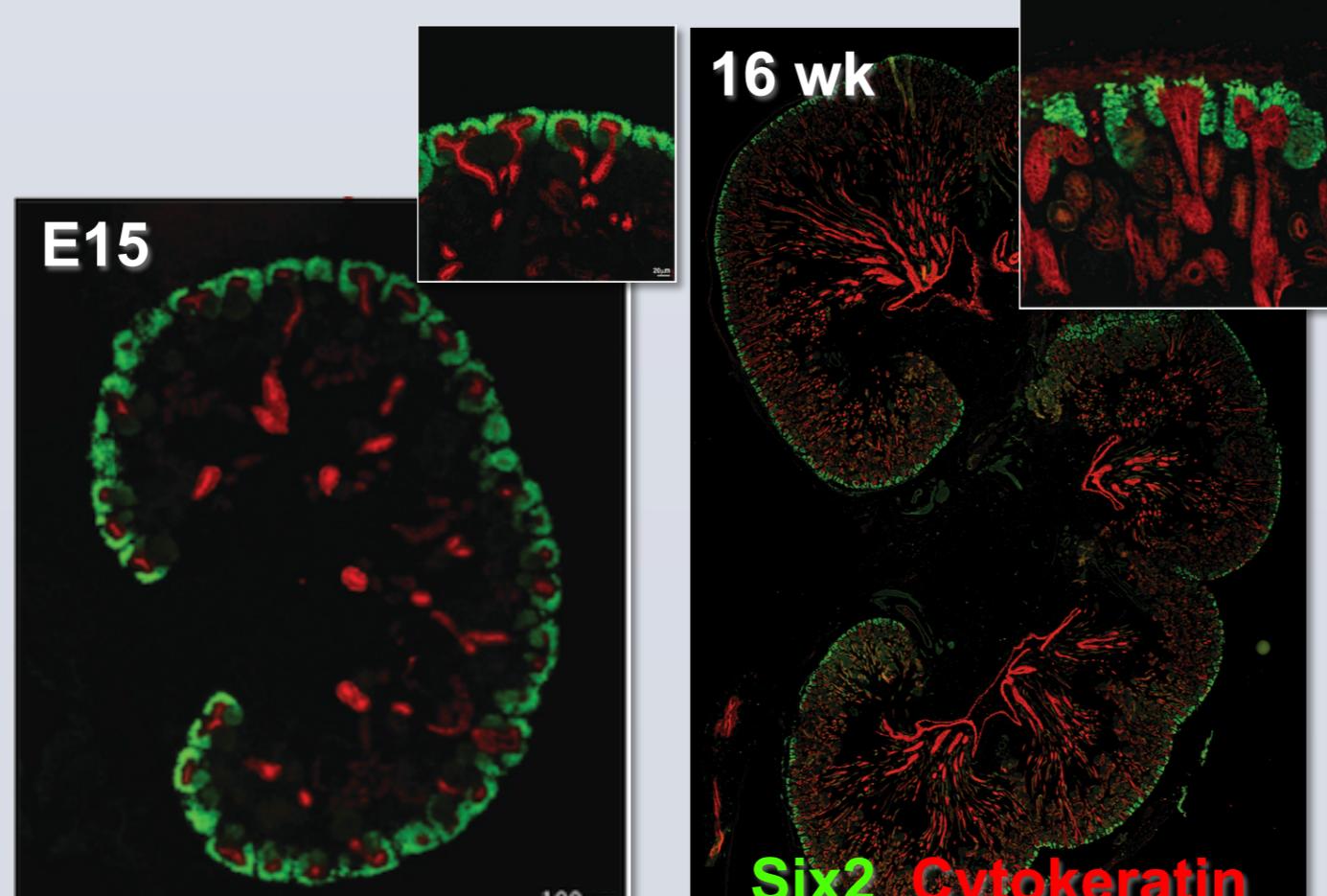
Human GUDMAP "hGUDMAP"

In Situ Hybridization (A. McMahon Lab)

Human Kidney

15 wk

Mouse Kidney

E14

Immunohistochemistry

16 wk
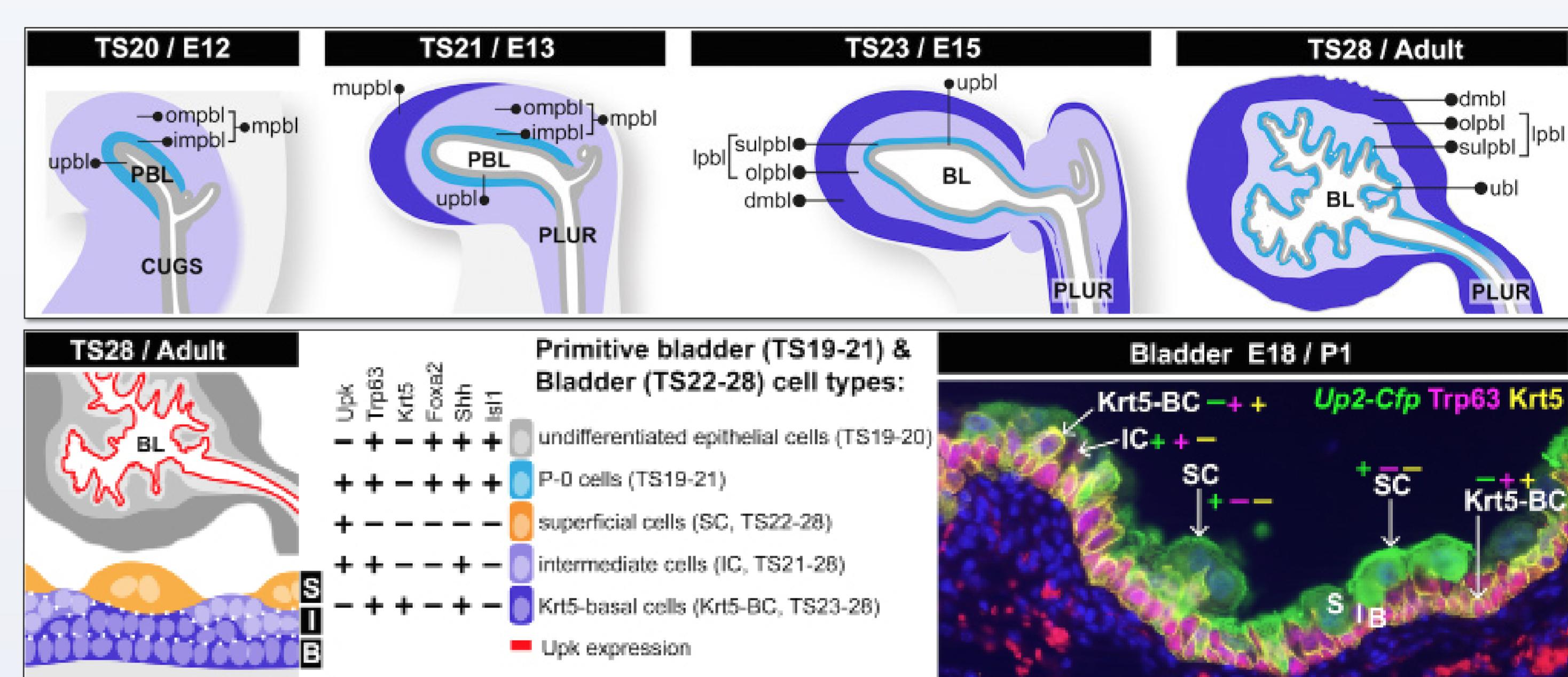
E15

100µm   Six2 Cytokeratin

Schematics, Tutorials & Tissue Summaries

GUDMAP holds an extensive archive of high-quality schematics diagrams that illustrate different views of the developing mouse GU system
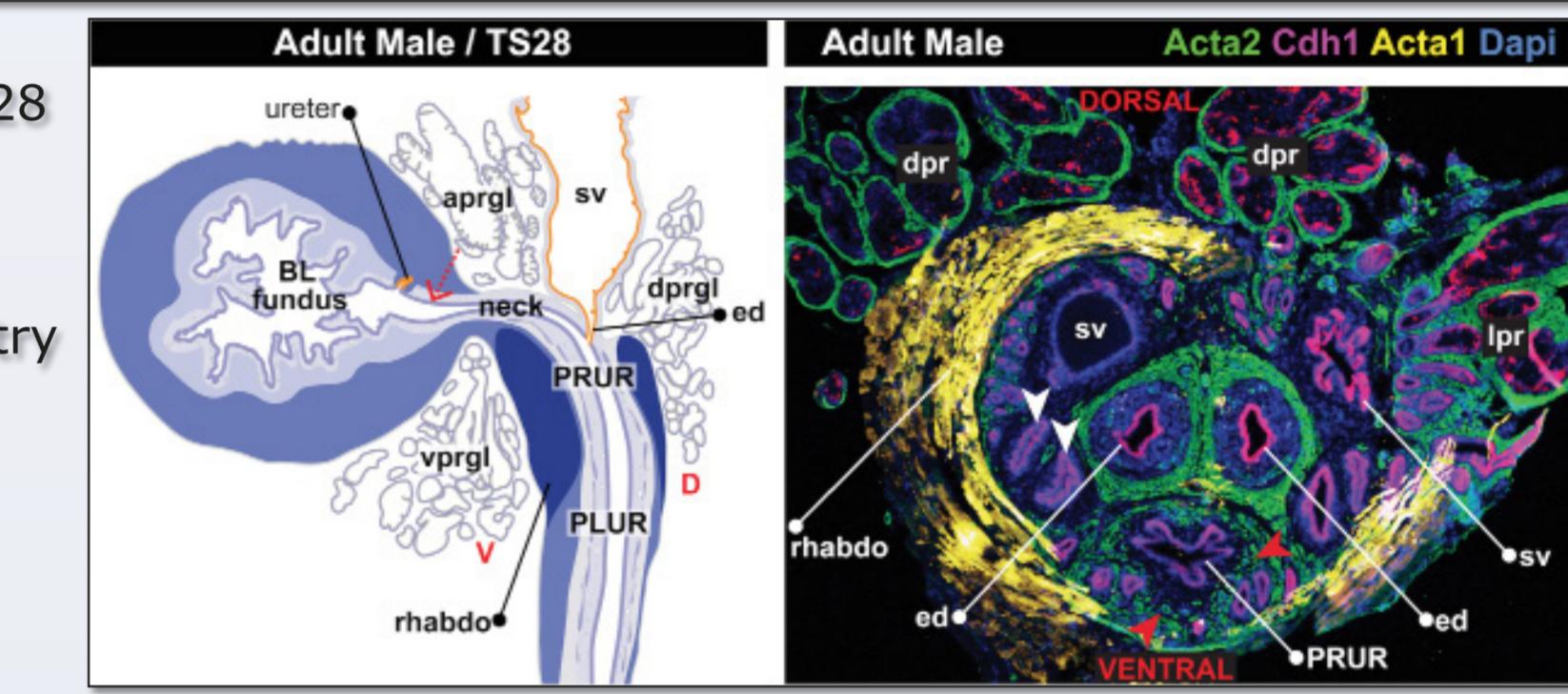
www.gudmap.org/Schematics/index.php

These **tutorials** supplement prior descriptions of GU organogenesis (Matt Kaufman) and enrich the GUDMAP Tissue Summary pages.

Top: Annotated sections of the bladder at TS20 (12 dpc), TS21 (13 dpc), TS23 (15 dpc) and TS28 (adult).

Middle: TS28 (adult) annotated section of the bladder with corresponding immunohistochemistry section.

Right: TS28 (adult) annotated section of the male prostate with corresponding immunohistrochemistry section.
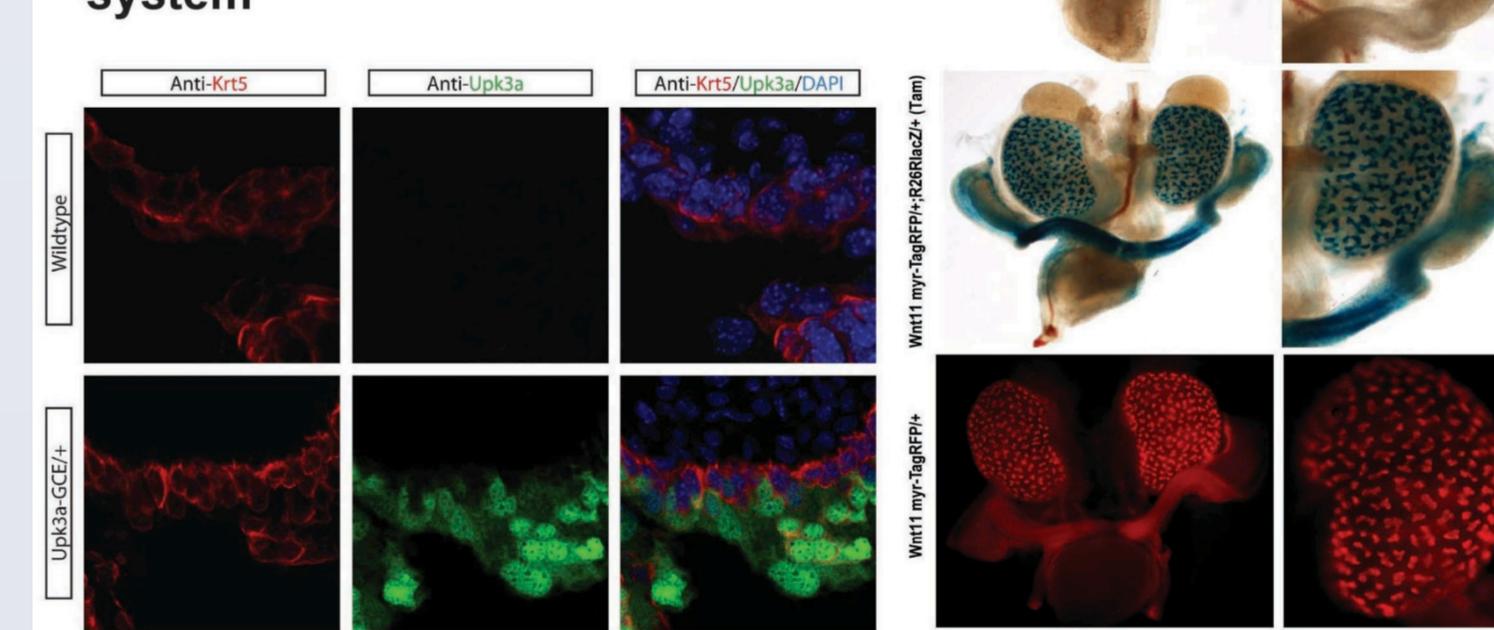
Novel Mouse Strains for Visualising, Isolating and Genetically Manipulating the GU System
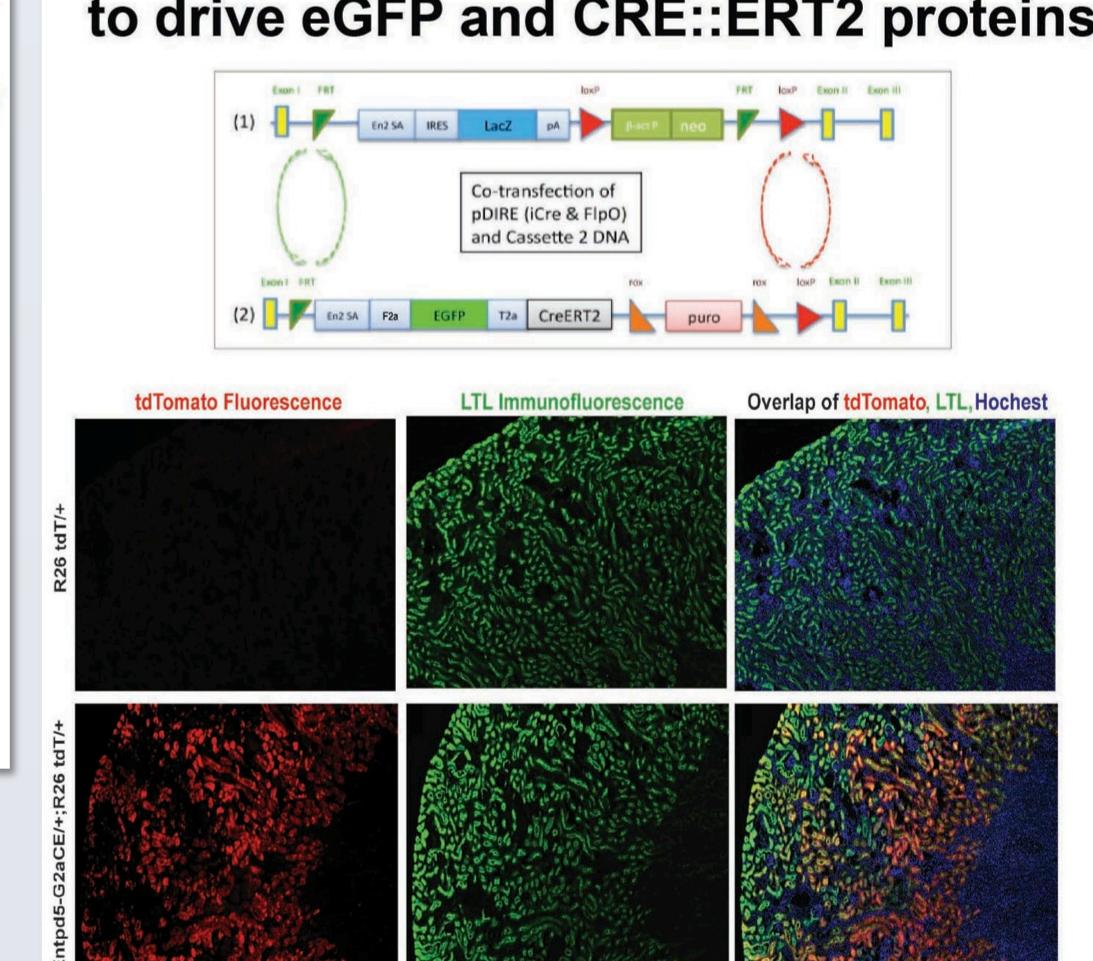
Goals:
- To mark key cell populations in order to isolate, trace or modulate gene activity
- Promote nominations of candidate loci from scientific community.
- Mice made available through the MMRRC (Jackson Labs).
- Nominate strains: **www.gudmap.org/MS_GeneNoms.html**

Part I: Use BAC mediated mouse transgenesis to drive eGFP and RFPT::Cre::ERT2 fusion proteins in specific cell types in the GU system
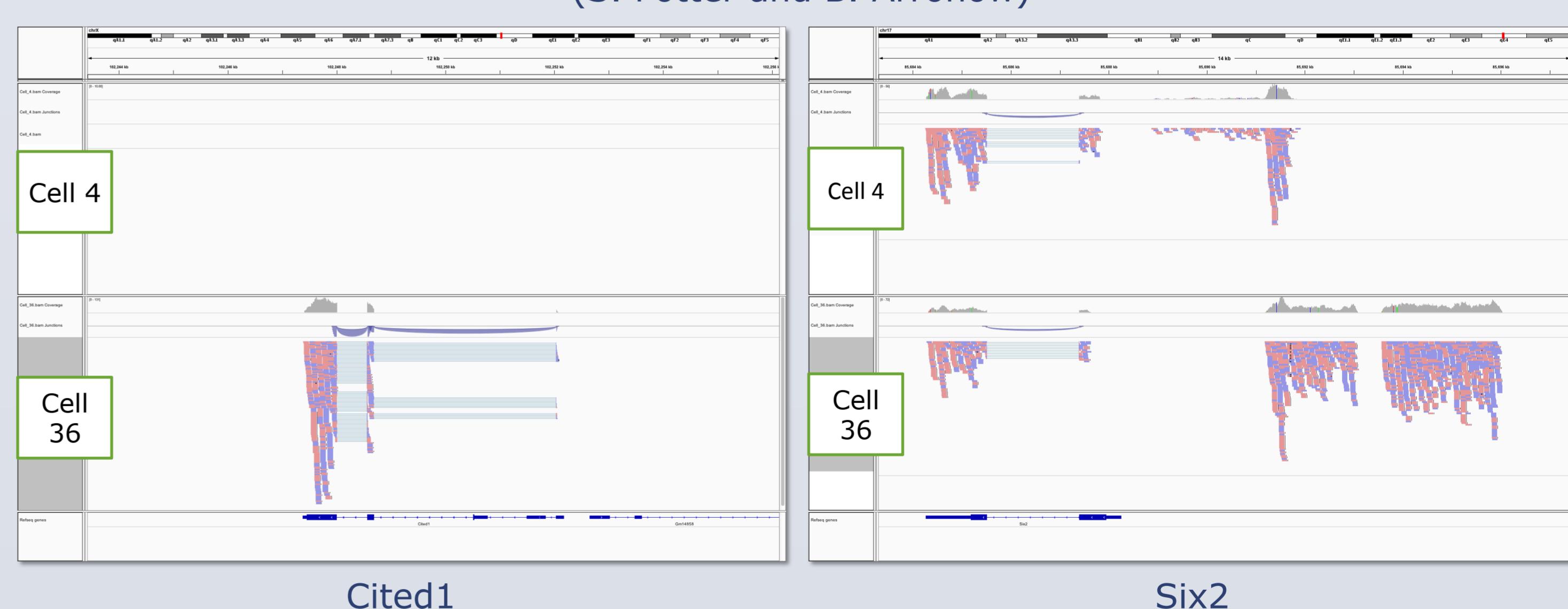
Part II: Obtain ES Cell clones through KOMP(NIH) and EUCOMM Consortia, create new alleles by dual Recombinase Mediated Cassette Exchange (dRCME) to drive eGFP and CRE::ERT2 proteins

Gene Expresssion Profile Analyses of GUDMAP Data

IGV Genome Browser View of Single Cell Data -- E11.5 metanephric mesenchyme (S. Potter and B. Arronow)

Cell 4   Cell 36   Cited1

Cell 4   Cell 36   Six2

References

All past contributors to GUDMAP can be found at **www.gudmap.org/About/Projects/**

- Georgas KM et al. (2015). An illustrated anatomical ontology of the developing mouse lower urogenital tract. Development. 142(10):1893-908.

- Ganghi D et al. (2013). Retinoid signaling in progenitors controls specification and regeneration of the urothelium. Dev. Cell. 26(5): 469-482.

- Harding SD et al. (2011). The GUDMAP database - an online resource for genitourinary research. Development. 138(13):2845-53

- McMahon AP et al. (2008). GUDMAP: the genitourinary development molecular anatomy project. J. Am. Soc. Nephrology. 19(4):667-71