UCSC Genome Browser
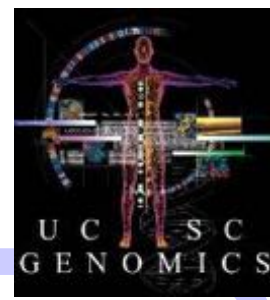
Brian Lee
UC Santa Cruz

Genomics in Action Workshop

University of Oregon

@GenomeBrowser

Acknowledgements
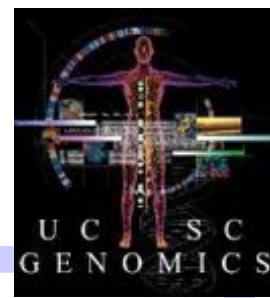
Acknowledgements

UCSC Browser team

– **David Haussler** **– co-PI**

– **Jim Kent** **– Browser Concept, BLAT, Team Leader, PI**

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UCSC = UC Santa Cruz
!= USC, USCS, UCSF, UCSD....

Browser Team

Overview Objectives

Site Overview

Site Architecture, Navigation and Configuration

Lesser Known Treasures

 Multiple Highlights & Keyboard Shortcuts

 BLAT across multiple Species

a

 Gene Interactions Tool and Track

New Data Tracks, Formats and Tools

 New CRISPR and GeneHancer Tracks

 New Interact Data Format
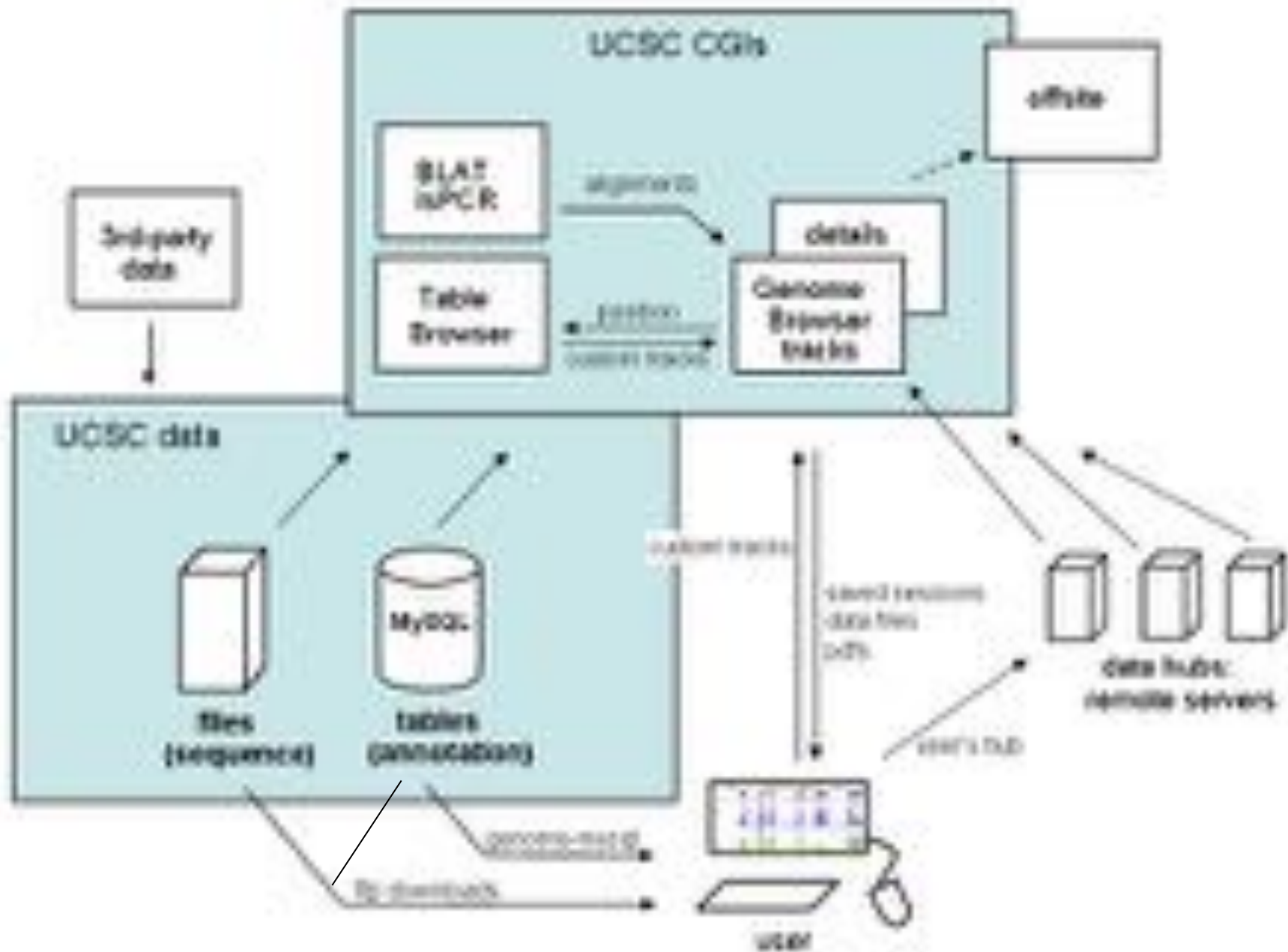
 New Short Links to Sessions & Public Sessions

UCSC Genome Browser

Display engine for genomic annotations. Consistent interface across genomes.

A tool for inquiry-driven discovery.

http:genome.ucsc.edu

architecture

architecture: GTEx

Top "GTEx Gene" track (available under Expression section) in bargraph display

- **Summarizes Gene Expression in 53 tissues from GTEx RNA-seq of 8555 samples (570 donors) in one box**

Lower individual signal tracks from "GTEx RNA-seq Signal Hub" (available from Public Hubs page)

GTEx Gene bargraph track (MySQL)

GTEx RNA-seq Signal Hub (bigWig)

architecture: GTEx

GTEx RNA-seq signal (bigWig) Track Hub

GTEx Gene bargraph track

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Top Blue Bar Menu: Genomes **a Gateway to Discover Multiple Assemblies**

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Top Blue Bar Menu: Select Configure **to see a list of all tracks for an assembly and alter display**

UCSC Genome Browser

Top Blue Bar Menu: Change settings like Text Size **and see a list of all tracks on Bottom Blue Bars**
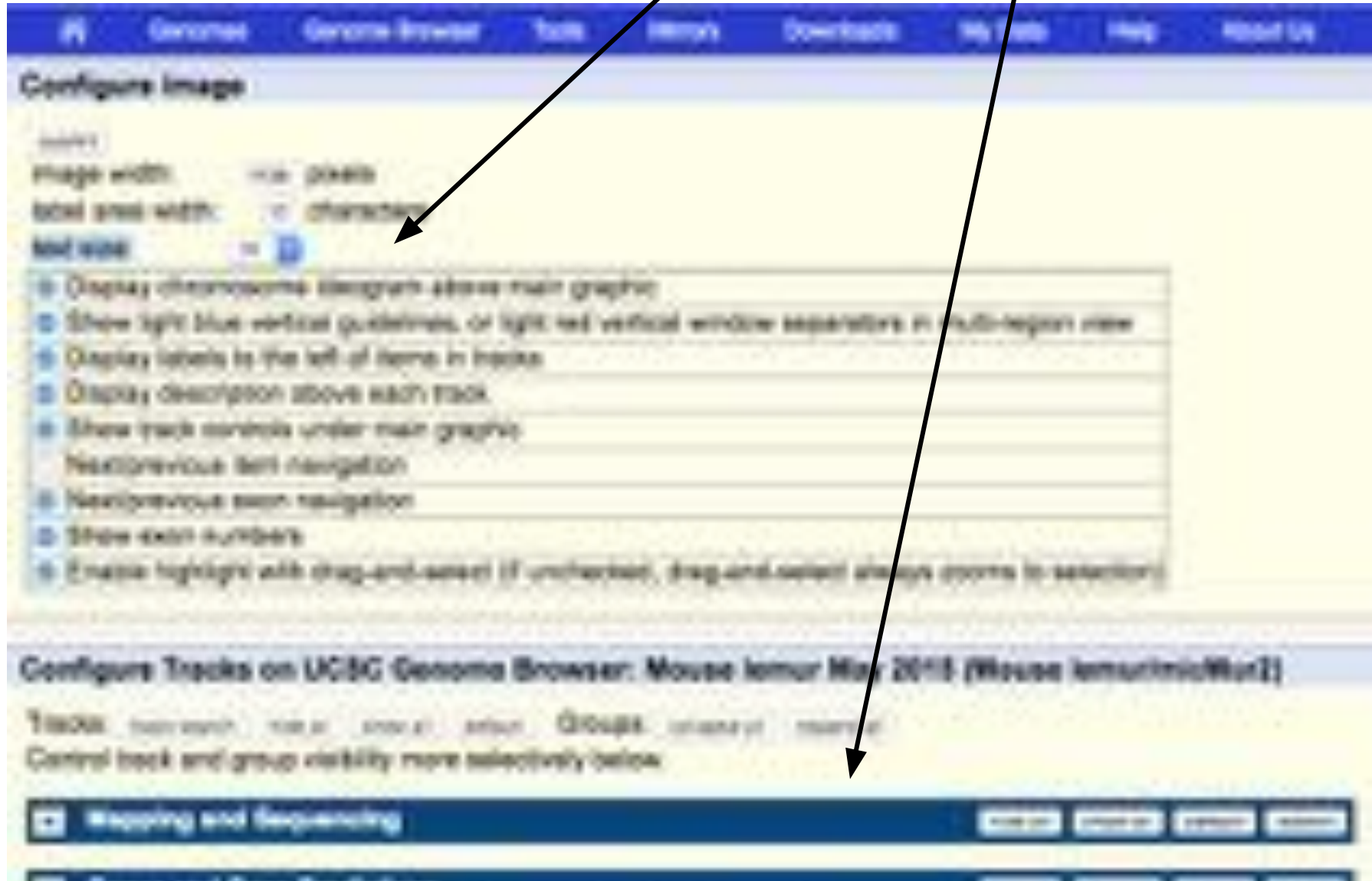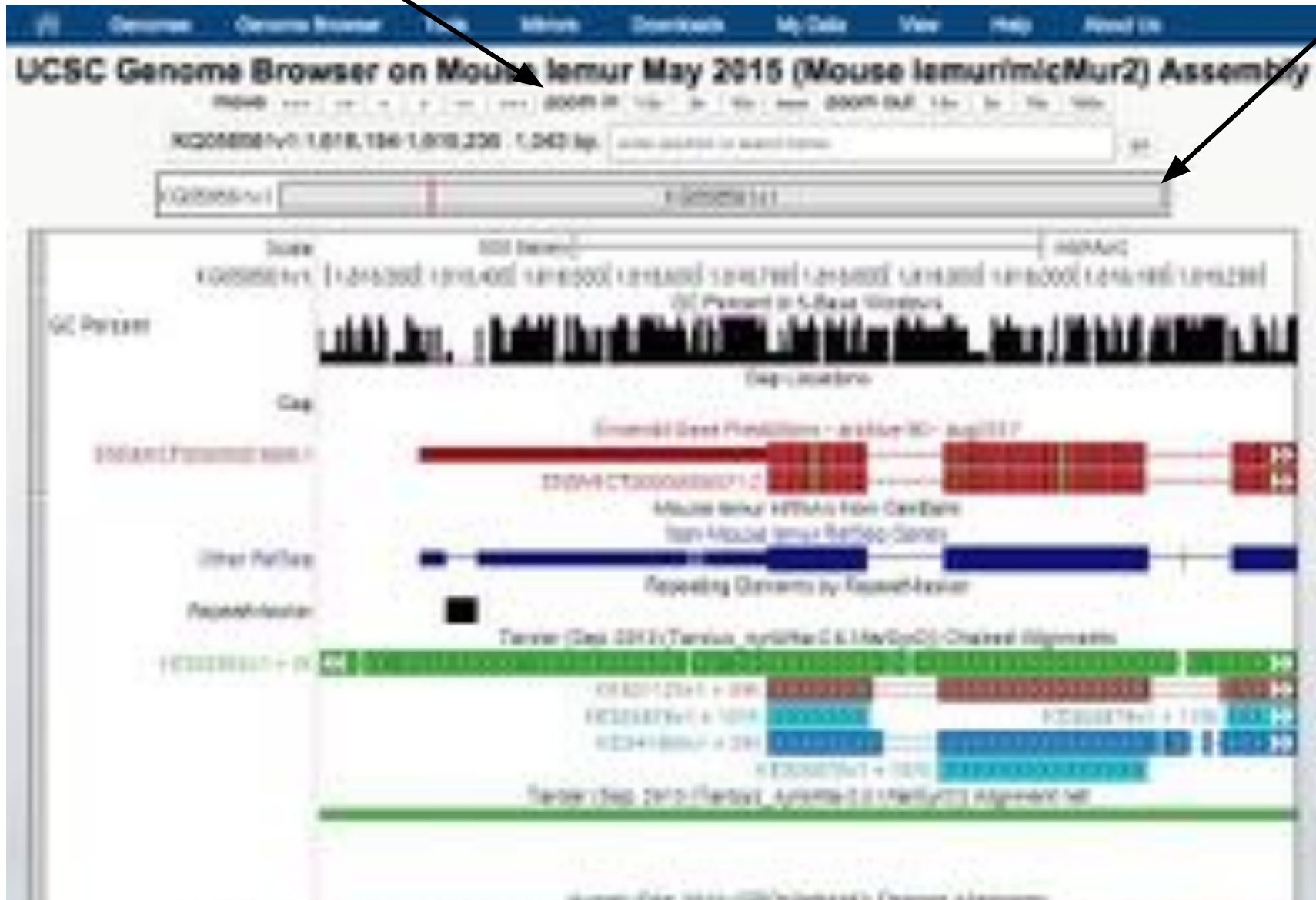
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Bottom **Blue Bars: Represent** Groups **Of Track Data (**hide, dense, pack, full**) Visibilities States**

UCSC Genome Browser

UCSC Genome Browser

Browser: Drag and Select **to Zoom** or **to Create Highlights**. Multiple highlights and **colors** are possible.

UCSC Genome Browser

Press **?** to See **Shortcuts.** Use numbers *1 to 6* to quickly zoom to bp regions: 5*0* to 5,***000,000*** bp

UCSC Genome Browser

Top Blue Bar Tools **Menu: Select** Blat **to search DNA queries across available Browsers**

UCSC Genome Browser

Top Blue Bar Tools **Menu: Select** Blat **to search DNA queries across available Browsers**

Paste in a sequence (can rename) and select Search ALL to see hits across multiple species (otherwise searches just the current species)

UCSC Genome Browser

Top Blue Bar Tools **Menu: Select** Blat **to search DNA queries across available Browsers**

BLAT ALL allows navigating across multiple species based on specific sequence similarity

UCSC Genome Browser

Top Blue Bar Tools **Menu:** Gene Interactions **option brings you to text-mined protein interactions**

UCSC Genome Browser

Top Blue Bar Tools **Menu:** Gene Interactions **option brings you to text-mined protein interactions**

Graph shows genes related to the gene GNB2 **where clicking** other genes **will recenter the graph.**

UCSC Genome Browser

Top Blue Bar Tools **Menu:** Gene Interactions **option brings you to text-mined protein interactions**

Putting the mouse over Genes **will display information as will mousing over** lines.

Clicking lines shows text-mining details or clicking genes recenters the graph.
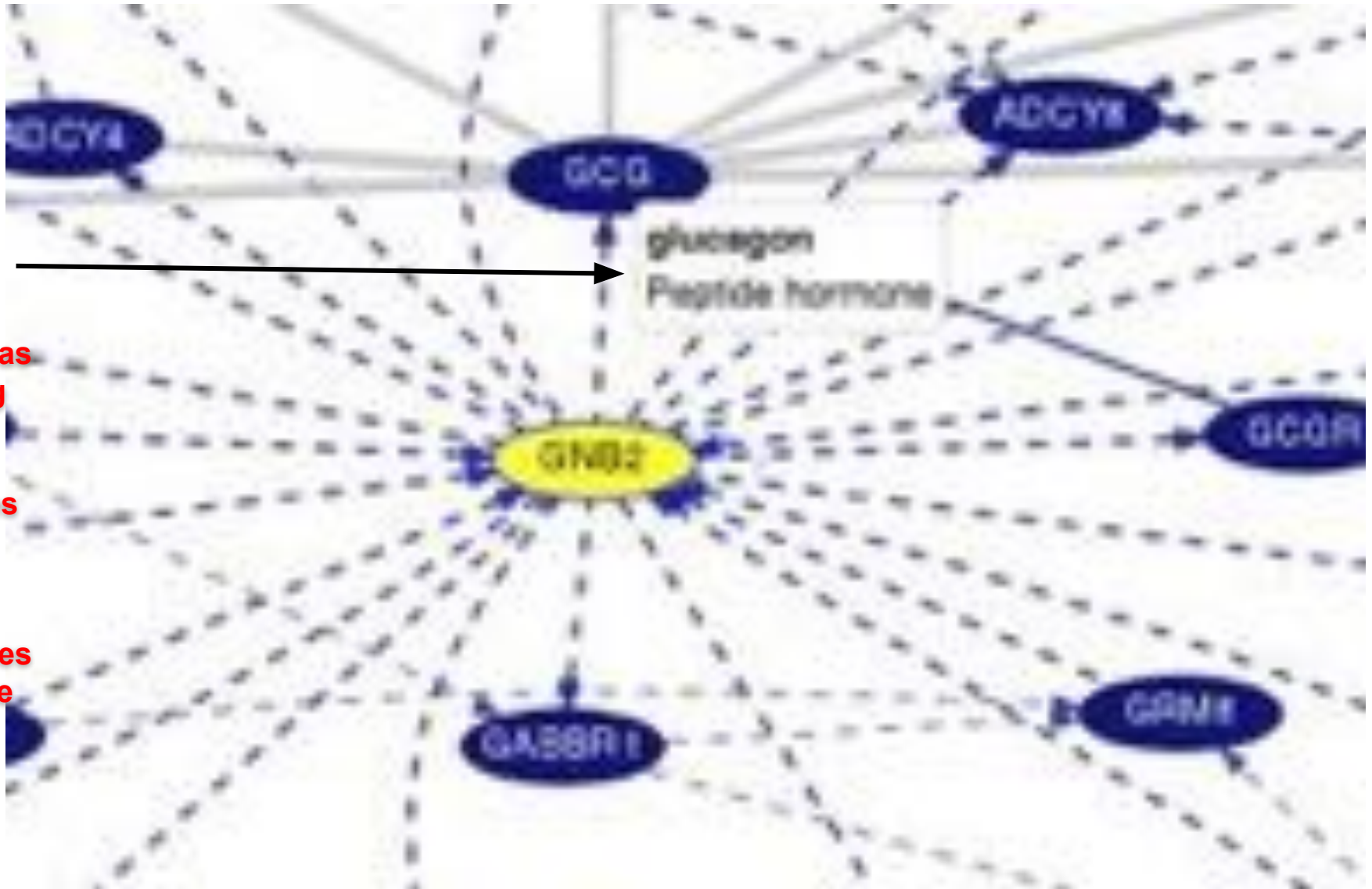
UCSC Genome Browser

Lower **Blue Bars: Different Track Groups including** CRISPR **and** Gene Interactions **and** GeneHancer

Scrolling down for Human hg38 Tracks shows available tracks

Under Phenotype Literature **section the** Gene Interactions **can be turned on by switching** hide **to** full **and clicking** refresh.

UCSC Genome Browser

Lower **Blue Bars: Different Track Groups including** CRISPR **and** Gene Interactions **and** GeneHancer

Under Genes and Gene Predictions **section you can find the** CRISPR **tracks.**

Under Regulation **section you can find the new** GeneHancer **tracks**

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GeneHancer **track uses new interact format to display human regulatory elements (enhancers and promoters) and their inferred target genes.** CRISPR **track shows color-coded predicted target sites.**

GeneHancer **has a track to denote enhancers and promoters and then an** Interactions **track to graphically show associations with nearby genes.**

The CRISPR **track has colored targets** (green/yellow/red) **annotated for predicted cleavage around coding regions with details of potential off-targets listed.**

Interactions

New data format

New data display

Distant SNP-Gene Interactions (Trans eQTLs) from GTEx Analysis

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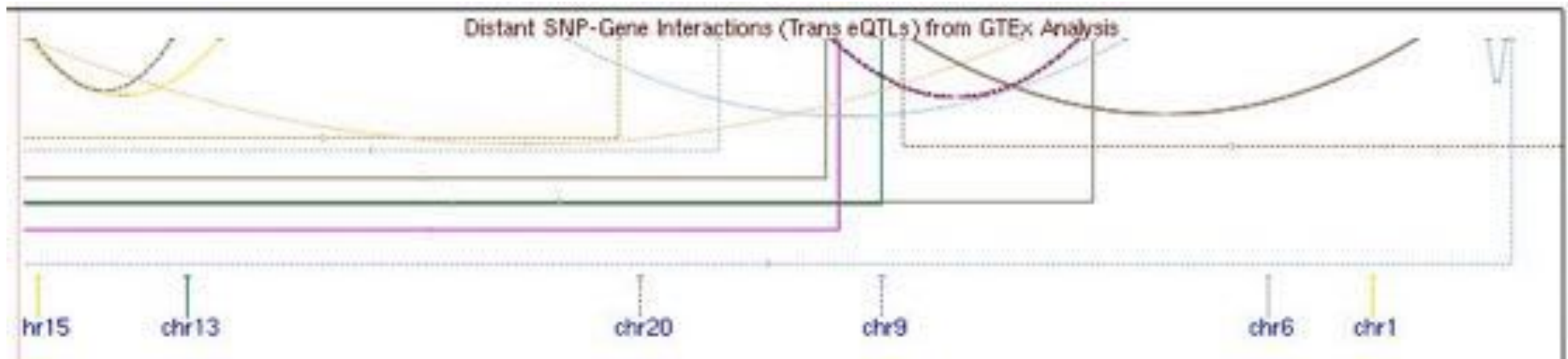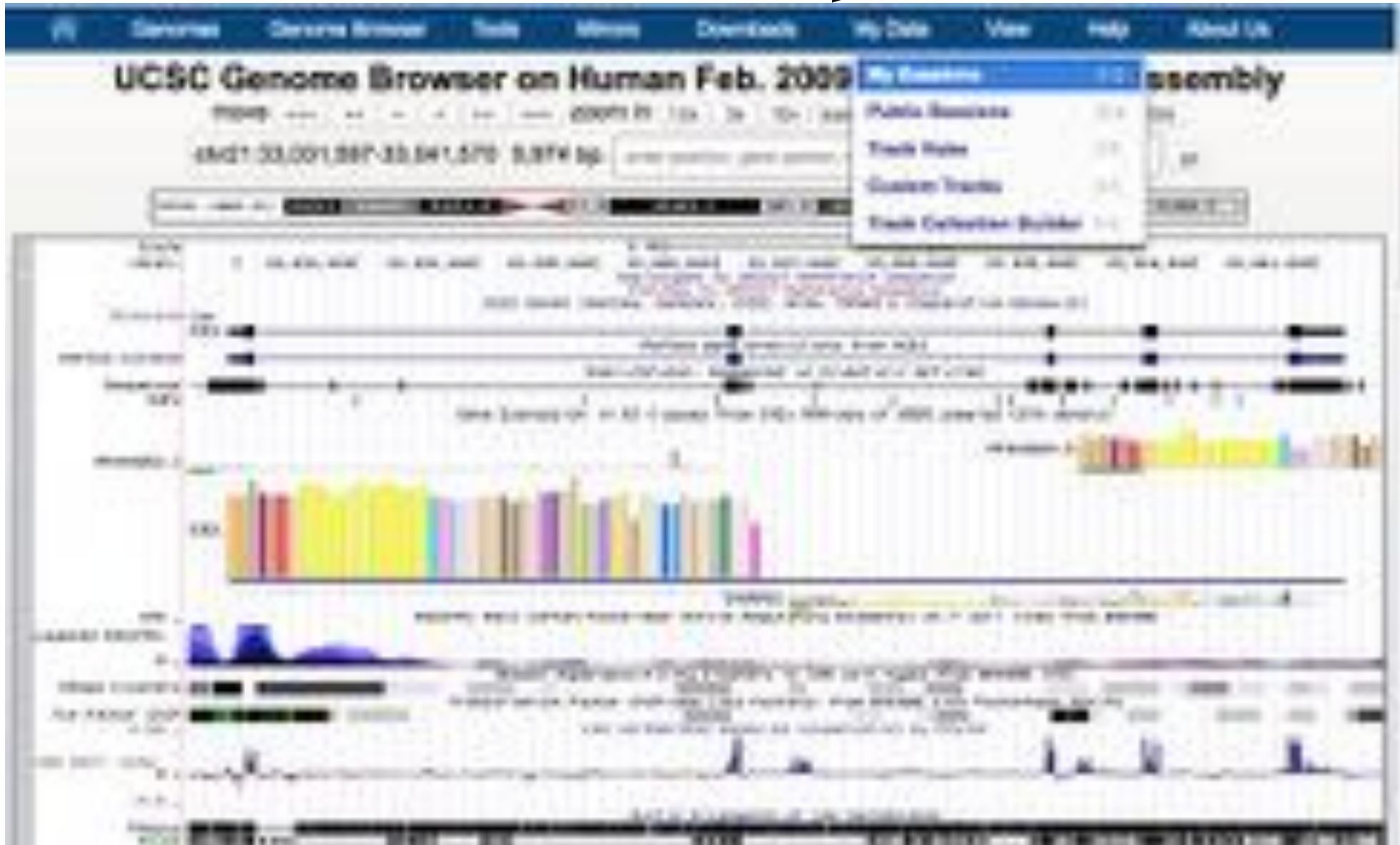# UCSC Genome Browser

My Data Top Blue Bar Menu: My Sessions **Allows You to Create a Snapshot of Your Browsing**

Your Account Information

Username view

Change password

Sign out

Create an account username **and then save a** *session name* **as you are browsing the site to return to views of data later.**

Session Management

See the Sessions User's Guide for more information about this tool. See the Session Gallery for example sessions.

Click here to reset the browser user interface settings to their defaults.

My Sessions

Show 10 entries   Search:

session name (click to load)	created on	assembly	view details	delete (this session)	share with others?	post in public listing?	send to mail
AssertionSupport	2016-10-08	hg18	entry	access	●	●	Email
GeneSupport	2016-10-08	hg18	entry	access	●	●	Email
MolecularEngineering	2016-10-08	hg18	entry	access	●	●	Email
Expression	2016-10-08	hg18	entry	access	●	●	Email
Clinical	2016-10-10	hg18	entry	access	●	●	Email
ClinicalLite	2016-10-10	hg18	entry	access	●	●	Email
Clinical2exam	2016-10-10	hg18			●	●	Email

UCSC Genome Browser

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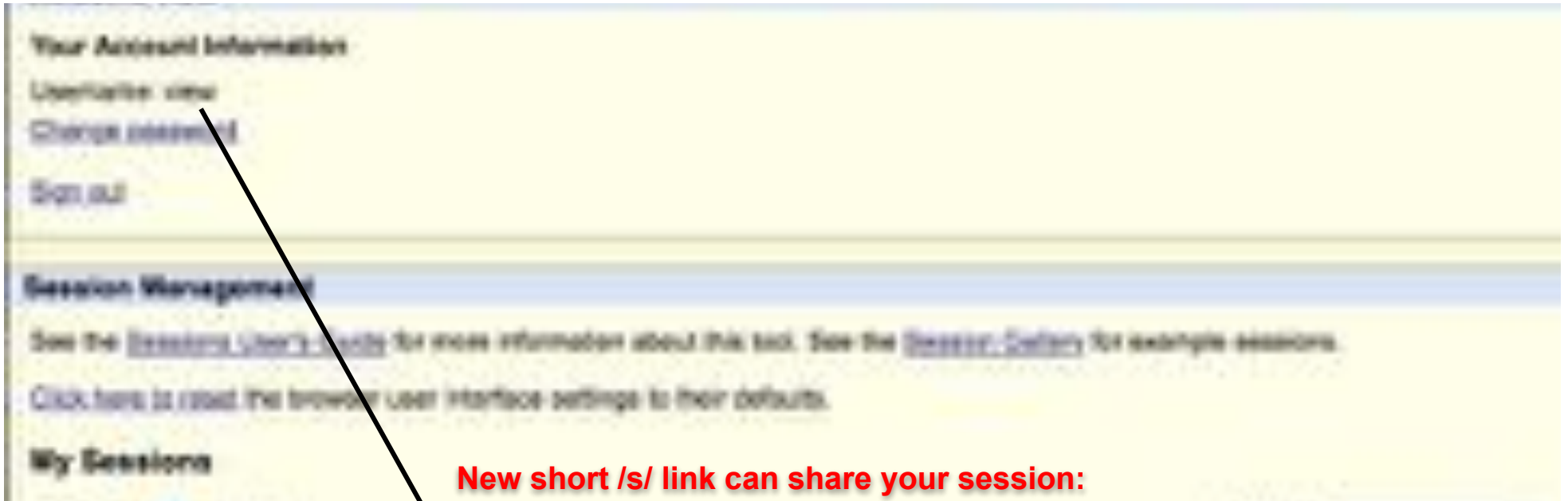
My Sessions

New short /s/ link can share your session:
http://genome.ucsc.edu/s/yourUserName*yourSessionName*

http://genome.ucsc.edu/s/**view**/*AssemblySupport*
http://genome.ucsc.edu/s/**view**/*GeneSupport*
http://genome.ucsc.edu/s/**view**/*MolecularEngineering*
http://genome.ucsc.edu/s/**view**/*Expression*
http://genome.ucsc.edu/s/**view**/*Clinical*
http://genome.ucsc.edu/s/**view**/*ClinicalLite*
http://genome.ucsc.edu/s/**view**/*ClinicalZoom*

UCSC Genome Browser

Search Public Sessions

Search box "SessionView" (sorts to sessions with this unique tag)

- **Click on image to jump to session (sort by newest first)**

Add your own Public Sessions via the "My Sessions" page (add descriptions to make them discoverable)

Training and Mailing List

YouTube training channel: [YouTube] bit.ly/ucscVideos

On-site workshops (training link on main page):

   http://   genome.ucsc.edu/training/

Mailing list (training link on main page):

   http://   genome.ucsc.edu/contacts.html

UC Santa Cruz Genomics Institute