

## 2. SynBrowser

SynBrowser shows syntenic relationships between two chosen species with annotated genes of a reference species. Users can easily navigate the reference chromosomes by using coordinates or genes.

### (1) Selecting a reference species

The screenshot shows the SynBrowser interface. The 'Reference' dropdown menu is open, displaying a list of species and their assembly versions. The 'Human (hg19)' option is selected and highlighted with a checkmark. Other visible options include Cow (bosTau6-8), Dog (canFam1-3), Horse (equCab1-2), Human (hg17-18), Mouse (mm7-10), Pig (susScr2-3), Rat (rn4-5), and Zebrafish (danRer10).

- Selecting a reference species and its assembly version.

### (2) Selecting a reference chromosome

The screenshot shows the SynBrowser interface with the 'Chromosome' dropdown menu open. The 'chr1' option is selected and highlighted. Other visible options include chr2, chr3, chr4, chr5, chr6, chr7, chr8, chr9, chr10, chr11, and chr12.

- Selecting a reference chromosome.

### (3) Selecting a target species

The screenshot shows the SynBrowser interface with the 'Target' dropdown menu open. The 'Mouse (mm10)' option is selected and highlighted. Other visible options include Chicken (galGal3), Chimpanzee (panTro4), Cow (bosTau7), Dog (canFam3), Gorilla (gorGor3), Horse (equCab2), Lizard (anoCar2), Marmoset (caLac3), Medaka (oryLat2), Opossum (monDom5), Orangutan (ponAbe2), Pig (susScr2), Rabbit (oryCun2), Rat (rn6), Rhesus (rheMac3), Sheep (oviAri3), Stickleback (gasAcu1), Tetraodon (tetNig2), Turkey (melGal1), and Zebra\_finch (taeGut2).

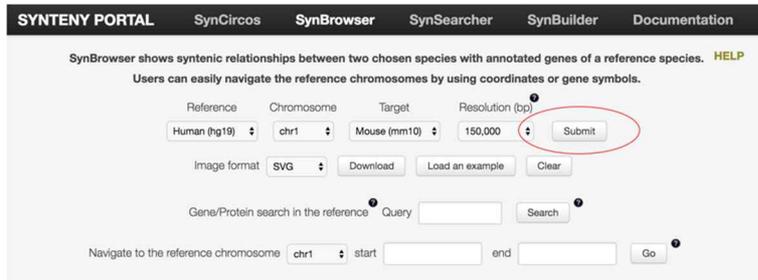
- Selecting a target species and its assembly version.

### (4) Selecting a resolution

The screenshot shows the SynBrowser interface with the 'Resolution (bp)' dropdown menu open. The '150,000' option is selected and highlighted. Other visible options include 300,000, 400,000, and 500,000.

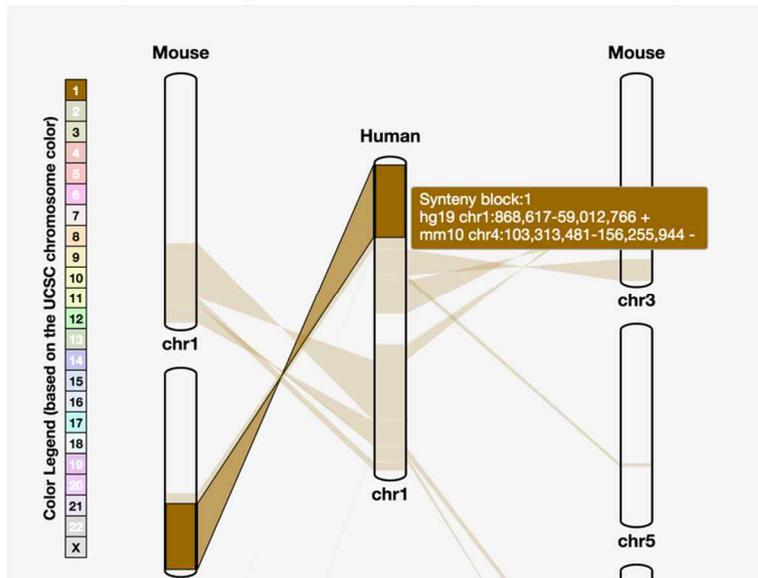
- Selecting a resolution of synteny blocks.

(5) Clicking the 'Submit' button for drawing syntenic relationships



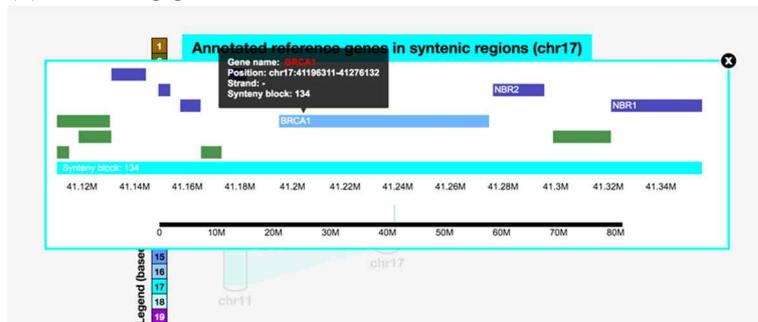
- The pairwise syntenic information appears in the bottom section as shown below.

(6) Putting a mouse pointer on a synteny block for seeing the details of the synteny block.



- User can easily see the details of synteny blocks with moving a mouse pointer on a specific synteny block.
- The information includes a synteny block number, the coordinates of reference and target genome.

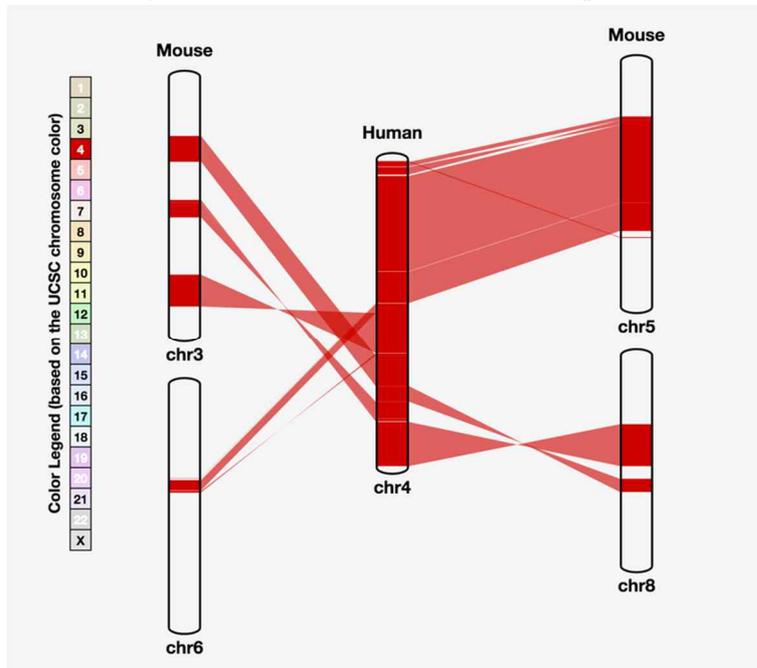
(7) Browsing gene annotations



- The gene annotation browser is opened when a specific synteny block is clicked on.
- The blue and green blocks represent the plus and minus strand genes, respectively.
- The names and simple information of the genes appear when a mouse pointer moves on the block.
- The color of a synteny block track (light blue in the figure) represents the reference chromosome color.
- The black scale bar at the bottom of the figure represents a selected reference chromosome.

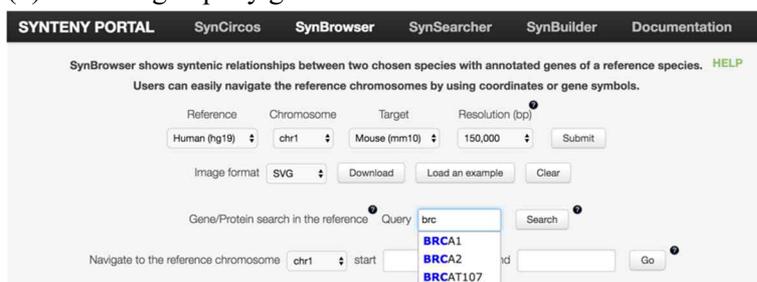
- The blue box on the black scale bar represents the selected region in the selected reference chromosome.
- Users can browse and move the tracks by mouse drags and wheels.
  - Mouse click and drag → Move track
  - Mouse wheel up/down → Zoom in/out
- Users also can move the tracks by dragging the blue box on the black scale.
- Users can resize the visible region by resizing the blue box on the black scale bar.
- When users clicks on a specific gene, the UCSC genome browser is shown.

(8) Selecting a reference chromosome in the left panel



- A reference chromosome can be changed when a chromosome number in the left panel is clicked on.

(9) Searching a query gene



- Users can search for a query gene/protein of the selected reference species by entering a query gene/protein name or identifier.
- We support WIKIGENE (e.g. BRCA1, TP53), REFSEQ\_MRNA (e.g. NM\_007300, NM\_001276760), Ensembl gene (e.g. ENSG00000012048, ENSG00000124251), Ensembl protein (e.g. ENSP00000350283, ENSP00000361811), Ensembl transcript (e.g. ENST00000357654, ENST00000372726), ENTREZGENE (e.g. 672, 27296), and PROTEIN\_ID (e.g. AAI15038, AAH36785).
- The query is auto-completed based on gene identifiers in WIKIGENE.

## (10) Searching a specific position of synteny blocks

The screenshot shows the SynBrowser interface with the following elements:

- Navigation bar: SYNTENY PORTAL, SynCircos, **SynBrowser**, SynSearcher, SynBuilder, Documentation
- Introductory text: SynBrowser shows syntenic relationships between two chosen species with annotated genes of a reference species. [HELP](#)  
Users can easily navigate the reference chromosomes by using coordinates or gene symbols.
- Search form:
  - Reference: Human (hg19) [dropdown]
  - Chromosome: chr1 [dropdown]
  - Target: Mouse (mm10) [dropdown]
  - Resolution (bp): 150,000 [input]
  - Submit button
- Image format: SVG [dropdown]
- Buttons: Download, Load an example, Clear
- Gene/Protein search in the reference: Query [input] Search [button]
- Navigate to the reference chromosome: chr17 [dropdown] start: 41,180,000 [input] end: 41,290,000 [input] Go [button]

- Users can search a specific region of the selected reference species in the browser by specifying a chromosome number, start and end positions.