Mark Ballora ballora@psu.edu

Rose Genetic Map sonifications

Reference:
Mohammed Bendahmane, M. et al. “The Rosa genome provides new insights into the domestication of modern roses.” *Nature Genetics* (50) (June 2018): 772-777. https://doi.org/10.1038/s41588-018-0110-3

NOTE: The audio files are AIFF format, 24 bit resolution. Please let me know if you need them converted to different specifications.

The datasets used are from Figure 1, the center panel scatter plots that show physical position on the chromosome along the X axis, and map position on the Y axis.

To be honest, I am not entirely clear on what this data means, being unfamiliar with genetics. But it seems that the correlations between physical and mapped positions is what is meant to be shown in the graphs.

Therefore, I’ve created two sound types, one for each position.

I’ve created alternate plots of them that show the physical position and map position as two different vertical axes, to show the contours that the sonifications are meant to render for the ear. I recommend viewing them while listening to the audio files.

The physical position seems to underlie everything, so I’ve mapped these positions to a low electroacoustic drone. It changes to reflect the position. The frequency and brightness both increase with the position number, and the pan position changes from low values on the left to high values on the right.

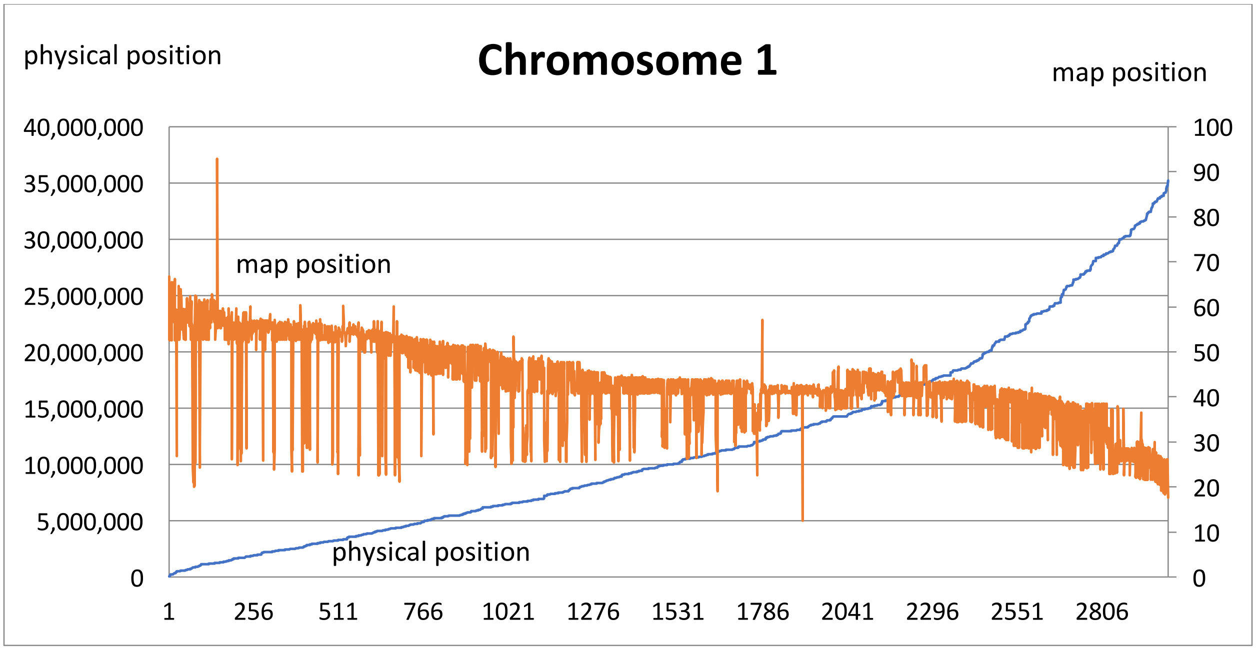
The mapped positions are played by a sound meant to resemble rubbing a finger along the edge of a wine glass. (The sound made me think of rose petals.) The frequency and pan position are similarly mapped to a higher pitch range.

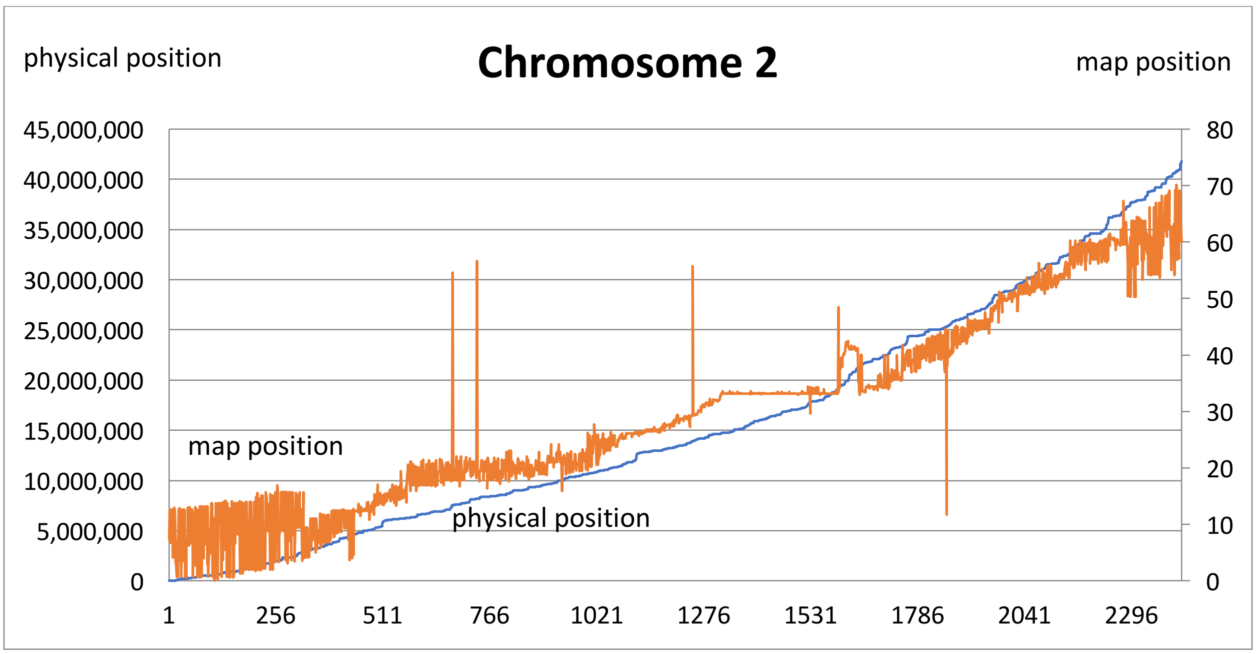
A secondary layer of the wine glass sound plays the large changes in values. That is, the dataset is iterated, and values that differ to a large extent from those just before and after them (±25), the data spikes, are played by a wine glass sound that is an octave higher than the basic wine glass track, and that has a different amplitude envelope to differentiate it. Different datasets have different numbers of these spikes – some have many, others have just a few.

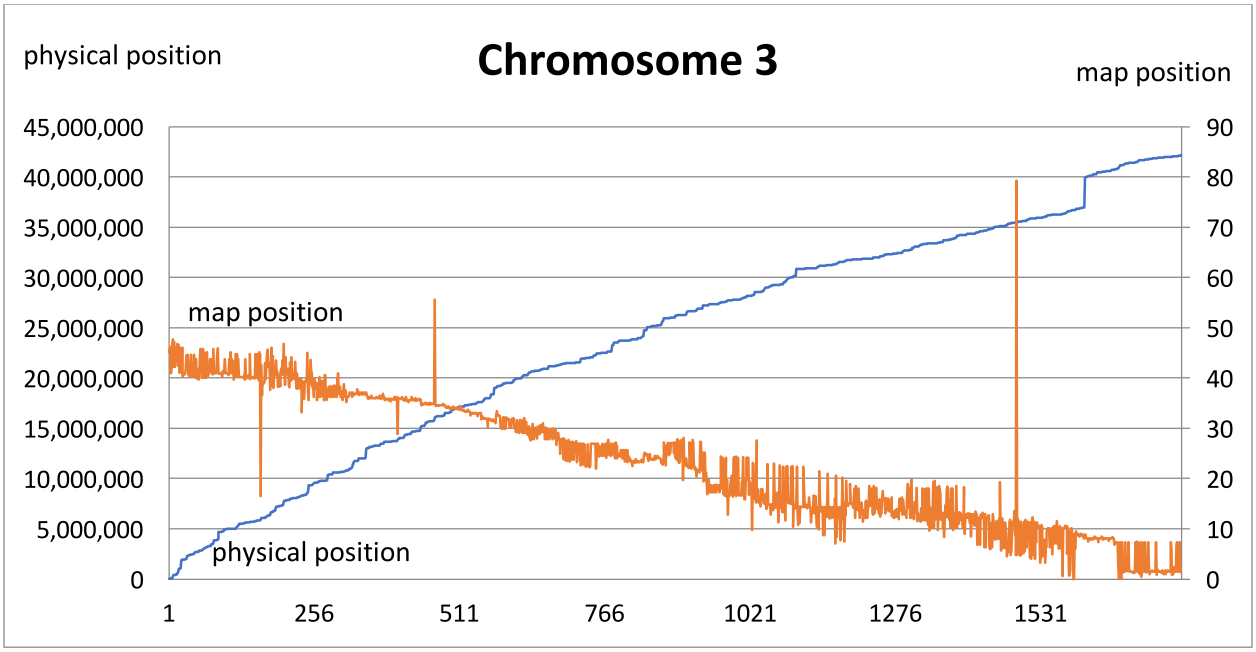
The datasets are large. I chose to play through them quickly, so that they last on the order of 45 seconds. This means that they go by in a kind of blur, with the data spikes ringing longer.

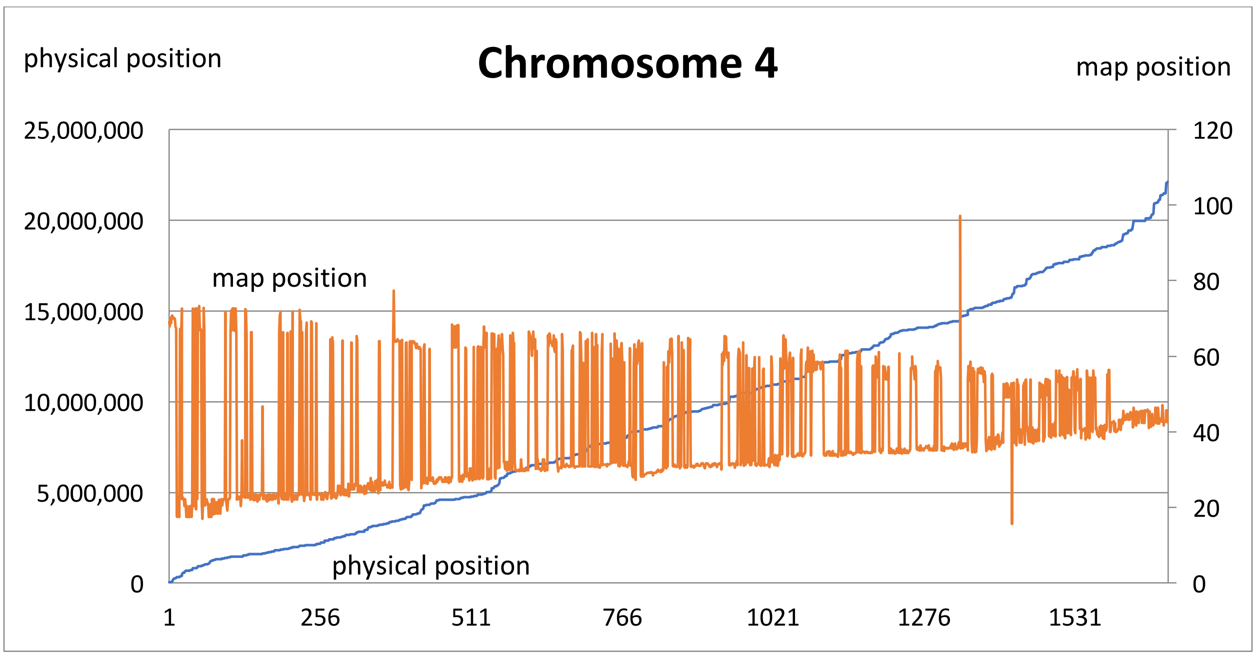
Playing through them more slowly produces some nice patterns at times, but I thought it best to create file lengths that were easy to listen to. It’s easy to create longer versions if need be.

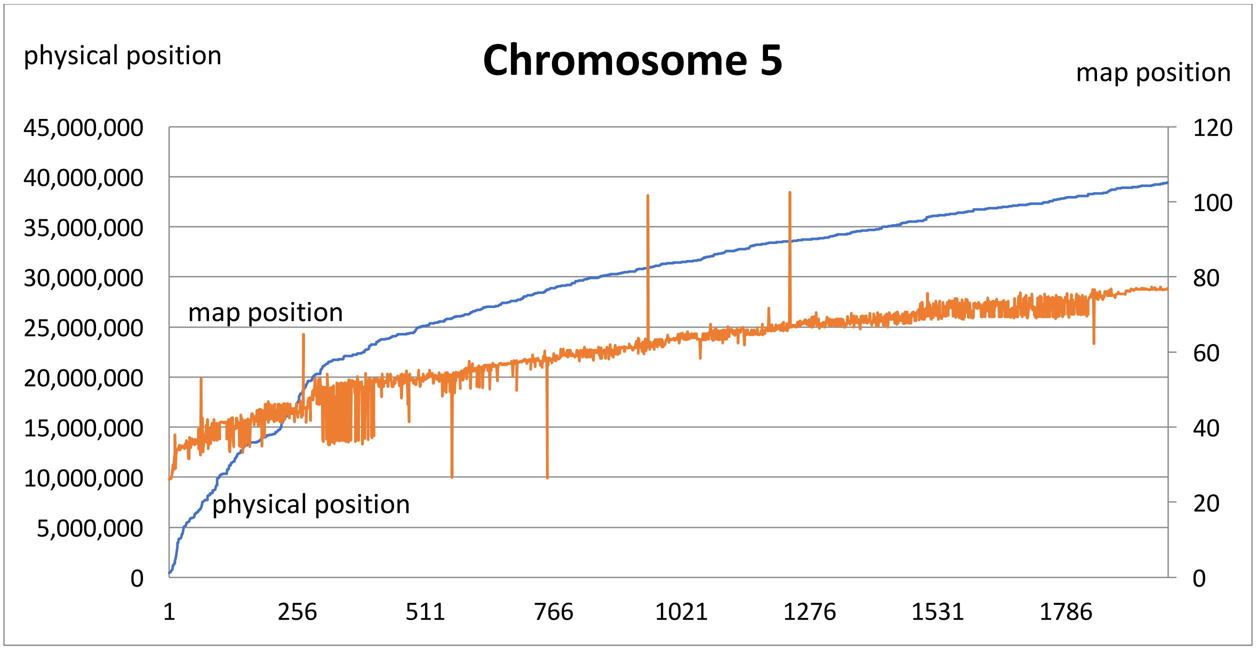
July 1, 2018


Chromosome 1
physical position
map position
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
100
90
80
70
60
50
40
30
20
10
0
map position
physical position
1
256
511
766
1021
1276
1531
1786
2041
2296
2551
2806

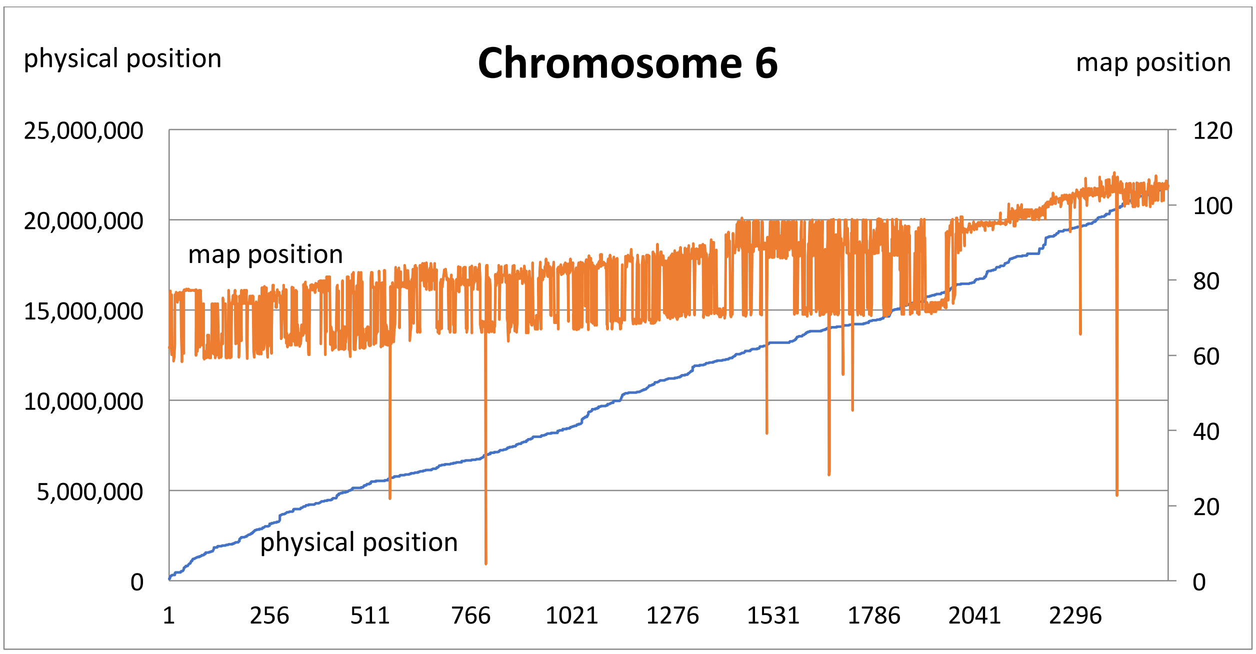

Chromosome 2
physical position
map position
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
80
70
60
50
40
30
20
10
0
map position
physical position
1
256
511
766
1021
1276
1531
1786
2041
2296


physical position
Chromosome 3
map position
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
90
80
70
60
50
40
30
20
10
0
map position
physical position
1
256
511
766
1021
1276
1531

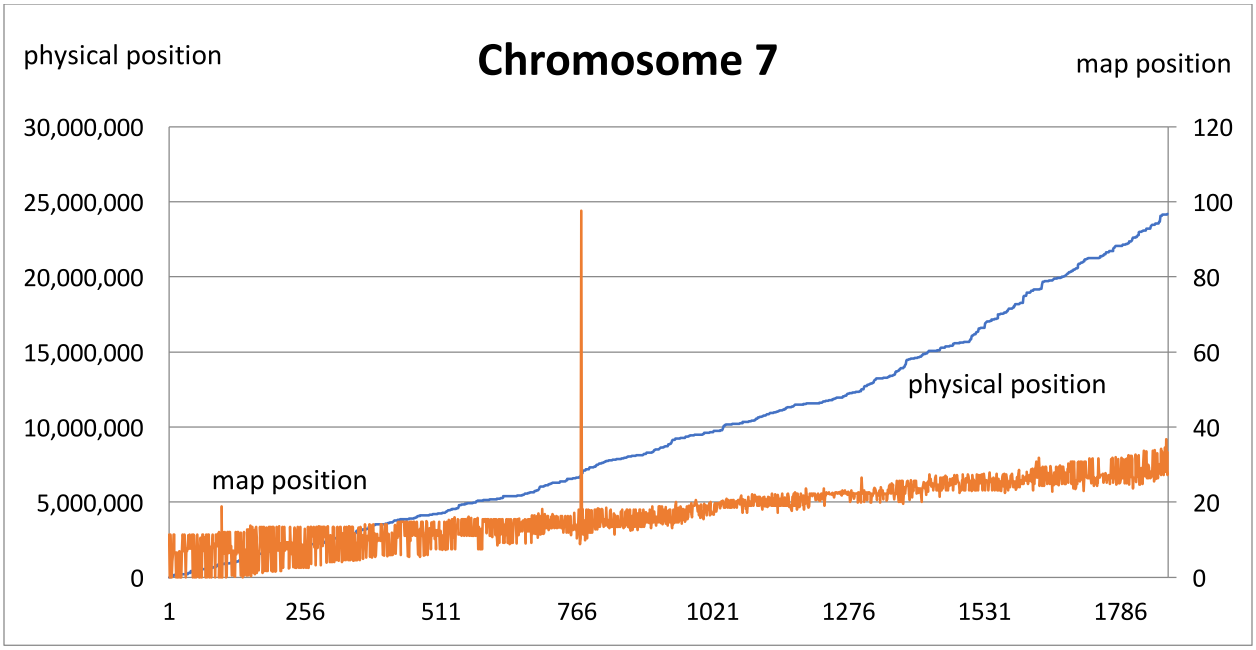

physical position
Chromosome 4
map position
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
120
100
80
60
40
20
0
map position
physical position
1
256
511
766
1021
1276
1531



Chromosome 5
physical position
map position
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
120
100
80
60
40
20
0
map position
physical position
1
256
511
766
1021
1276
1531
1786



Chromosome 6
physical position
map position
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
120
100
80
60
40
20
0
map position
physical position
1
256
511
766
1021
1276
1531
1786
2041
2296


physical position
Chromosome 7
map position
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
120
100
80
60
40
20
0
1
256
511
766
1021
1276
1531
1786
physical position
map position