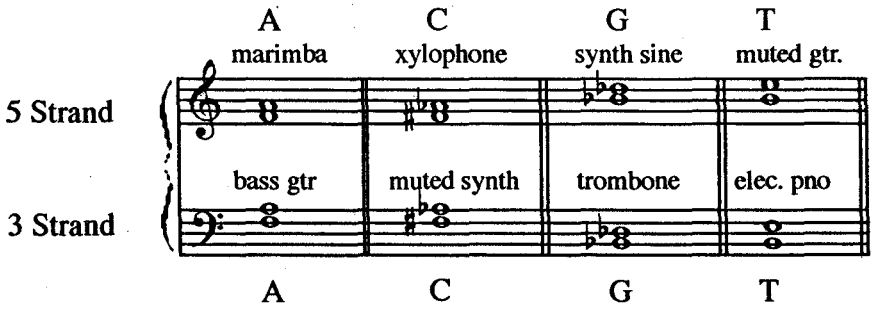
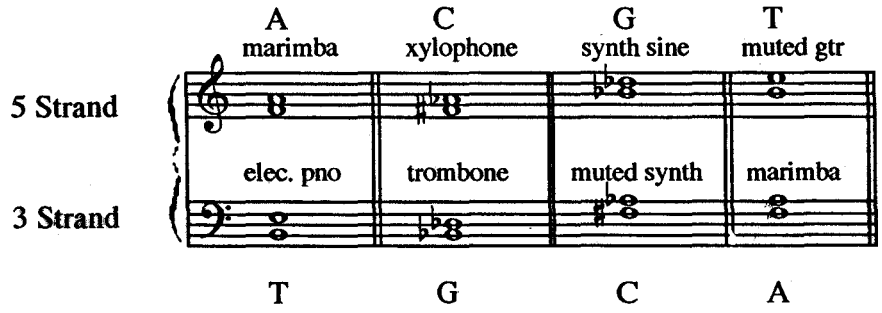
DNA Sequence Sonification Details **Bio 101 Spring 2003**
James Croson

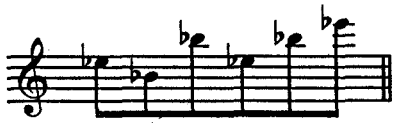
The four base nucleotides are mapped to these musical intervals and timbres:



But the pairings on DNA are with the complements.



Each codon specifying an amino acid is set as a rhythmic and melodic figure as shown on the right, and transposed according to the table below:



Amino Acid	Single letter code	Base Pitch
(stop)	X	B6
Histidine	H	Bb6
Arginine	R	A6
Lysine	K	Ab6
Glutamic Acid	E	G6
Aspartic Acid	D	F#6
Tyrosine	Y	F6
Glutamine	Q	E6
Asparagine	N	Eb6
Cysteine	C	D6
Threonine	T	Db6
Serine	S	C6
Glycine	G	B5
Tryptophan	W	Bb5
Phenylalanine	F	A5
Methionine (start)	M	Ab5
Proline	P	G5
Isoleucine	I	F#5
Leucine	L	F5
Valine	V	E5
Alanine	A	Eb5

Max/MSP lookup table:
(protein, midi notes;)

a, 75 70 82 75 82 87;
c, 86 81 93 86 93 98;
d, 90 85 97 90 97 102;
e, 91 86 98 91 98 103;
f, 81 76 88 81 88 93;
g, 83 78 90 83 90 95;
h, 94 89 101 94 101 106;
i, 78 73 85 78 85 90;
k, 92 87 99 92 99 104;
l, 77 72 84 77 84 89;
m, 80 75 87 80 87 92;
n, 87 82 94 87 94 99;
p, 79 74 86 79 86 91;
q, 88 83 95 88 95 100;
r, 93 88 100 93 100 105;
s, 84 79 91 84 91 96;
t, 85 80 92 85 92 97;
v, 76 71 83 76 83 88;
w, 82 77 89 82 89 94;
x, 95 90 102 95 102 107;
y, 89 84 96 89 96 101;

A particular DNA sequence of interest was run through an algorithm (a set of rules) in software (MAX/MSP) which automatically does the mappings, and the output MIDI notes drive a synthesizer. I mixed the 5-strand track, the 3-strand track, a track representing the amino acid/codon information, and a track of drums which clarified the sequential/rhythmic structure suggested by the DNA "ladder". Finally, I applied two filters to the above tracks which undulate at the rate of once every 10 bases (one offset from the other about 3 bases) to suggest the twining or twisting of the "ladder".