

Jeremy Clay

Molecular Mimicry

for flexible ensemble

Score in C

2013

Programme Note:

'*Molecular mimicry*' is a term that describes the process of the body's immune system mis-recognising its own antigens (particular proteins which live on the surface of cells) for those of a foreign pathogen and attacking itself.

It is hypothesized that *Molecular Mimicry* involved in the process of the body developing the auto-immune disease Sjögrens syndrome. The different elements behind this theory are directly related to different musical ideas within the piece. A particular bacteria suspected to be a trigger for this process is *Porphyromonas gingivalis* (*P. gingivalis*), the oral bacterium which causes bad breath.

The piece begins with a 'bacterial soup' representing the many bacteria living in the mouth. Slowly a melody emerges - the musical form of *P. gingivalis*:

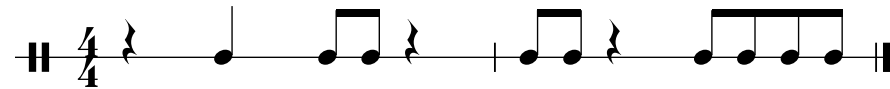


P. gingivalis is a bacteria which presents antigens that look very similar to other antigens presented by the body's own cells. In the music this is shown by performers harmonising with the *P. gingivalis* melody. The rhythms are the same, but the pitches are different.

This bacteria, or pathogen, is very similar in appearance to some of the body's own cells. In the music this is represented rhythmically similar harmonies.

The immune system tries to fight *P. gingivalis*, but because the bacteria look so similar to some of the body's own cells, it ends up attacking itself. This is the process of *Molecular Mimicry*. When the body attacks itself, it is described as *autoimmunity*. In molecular mimicry, auto-antigen cells present their antigens to T-cells using a 'lock-and-key' mechanism. See <https://www.youtube.com/watch?v=QIN5sSUIZWk>.

The music depicts this as a rhythm which locks into the rhythm of the *P. gingivalis* melody:



The music swells until the T-cells trigger an immune response – an alarm. The ensemble reacts by setting off alarm signals – a strong and frantic rhythmic response. The body begins to attack itself, mis-recognising itself. In Sjögrens Syndrome this takes a number of forms, one of which is that the tear ducts and mouth dry up, shown in the music by the change from loud resonant sounds into high pitched dry, scratchy sounds.

In addition to narrating the process of molecular mimicry the piece captures an element of the ways in which scientists have to work. This is done by linking in to the idea of 'fishing' to find which bacteria could be linked to Sjögren's Syndrome. It is fascinating that science with its reputation for exactness, is also groping in the dark, much like art! This process is shown musically in the first section of the piece where different musical 'bacteria' are present, and then one particular bacteria is fished out.

Performance instructions:

The score is open and free to interpretation. The performers can be as creative as they wish with the given material.

Sections followed by large black arrows are to be repeated ad lib.

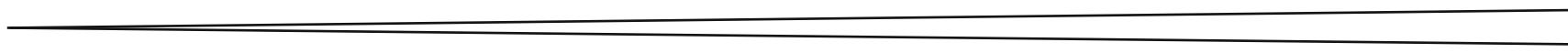
Durations of sections are flexible, however a likely duration for the whole piece is 2 to 3 minutes.

Molecular Mimicry

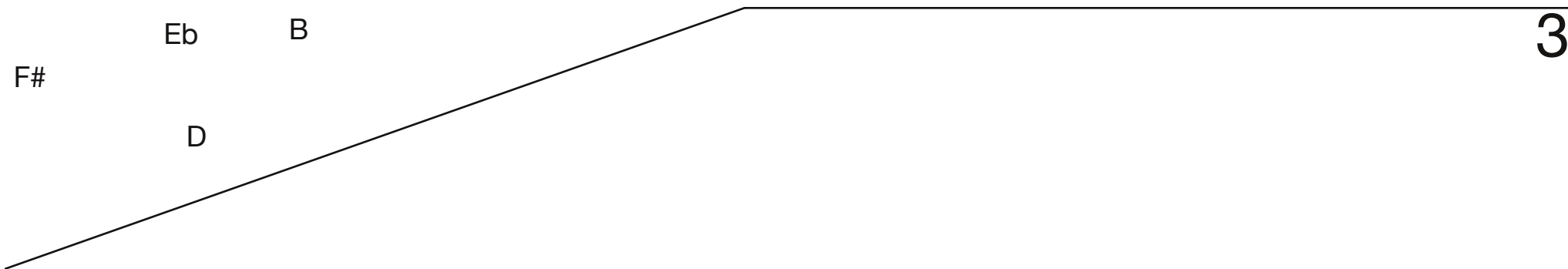
Bacterial Soup: Performers form short, quick, melodic fragments from some or all of the pitches below

A collection of musical notes scattered across the page, representing a pitch palette for the 'Bacterial Soup' exercise. The notes include A, Eb, G, F, D, C, F, Eb, A, C, D, F#, Eb, F#, D, B, G, C, B, G, F, Eb, C, F#, C, G, B, G, F, C, F#, and A.

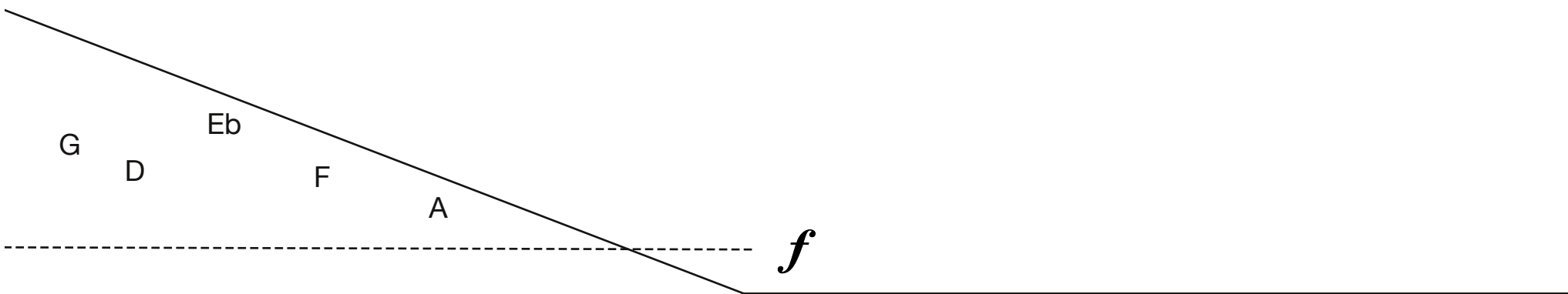
pp



mp



UNISON TUTTI



4

Molecular Mimicry: Harmonies with same rhythm as P. Gingivalis bacteria melody.



(Harmony)

(Melody)

(Harmony)

repeat



mp

Notes:

Harmonies above are suggestions only; performers are free to create their own harmonies.

For a simplified version, performers can choose just section 1, 2 or 3 to harmonise



crescendo -----

6

Immune system mistakes human antigen for foreign pathogen.

The musical score consists of four staves. The top staff is labeled '(Harmony)' and contains a treble clef, a 4/4 time signature, and a sequence of notes: quarter, quarter, eighth, quarter, quarter, quarter, quarter, quarter. The second staff is labeled '(Melody)' and contains a treble clef, a 4/4 time signature, and a sequence of notes: quarter, quarter, eighth, quarter, quarter, quarter, quarter, quarter. The melody is marked with '1', '2', and '3' above it, indicating three measures. A large arrow labeled 'repeat' points to the right from the end of the melody staff. The third staff is labeled '(Harmony)' and contains a treble clef, a 4/4 time signature, and a sequence of notes: quarter, quarter, eighth, quarter, quarter, quarter, quarter, quarter. The bottom staff is labeled 'Counter-rhythm' and contains a double bar line, a 4/4 time signature, and a sequence of notes: quarter, quarter, quarter, quarter, quarter, quarter, quarter, quarter.

(crescendo)

Notes:

Although the counter-rhythm is written unpitched, performers can choose pitches if they wish.

Alarm!
Immune system attacks own body

Brash, heavy

Sounds getting shorter and drier each time

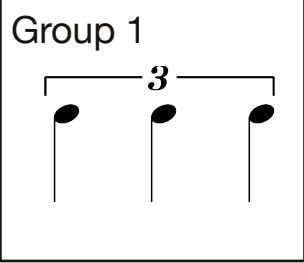


ff

8

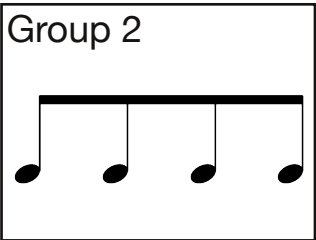
Very short and dry sounds

Group 1

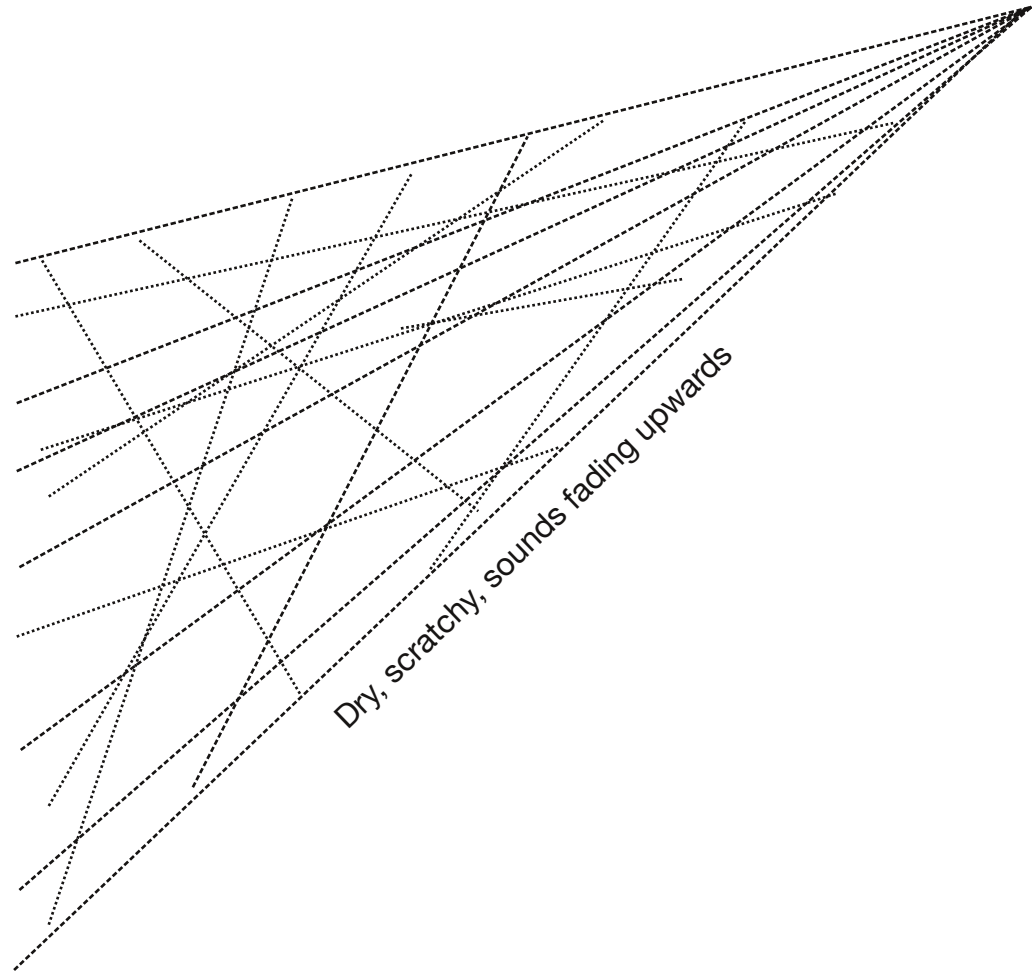


3

Group 2



x3



Dry, scratchy, sounds fading upwards

diminuendo ----- *pp*