Claims

1. An oxygen adapted strain of an anaerobic microorganism produced by

(a) culturing anaerobic microorganisms under conditions comprising a stepwise dual induction of oxidative stress by (i) increasing in a stepwise manner an applied voltage and oxygen diffusion, and (ii) reducing in a stepwise manner the concentration of an antioxidant combined with increasing in a stepwise manner the concentration of an oxidized counterpart, thereby changing the anti-oxidant/oxidized counterpart concentration ratio and adjusting the redox state to produce an oxygen adapted anaerobic microorganism strain having increased oxygen tolerance; and

(b) selecting the oxygen adapted anaerobic microorganism strain, wherein the oxygen adapted anaerobic microorganism strain is a strain of *Faecalibacterium prausnitzii*, and wherein the oxygen adapted anaerobic microorganism strain shows an increased level of tolerance to ambient air compared to a starting or parent strain which has not been made oxygen adapted.

2. The oxygen adapted strain of an anaerobic microorganism of claim 1, wherein the anti-oxidant/oxidized counterpart is selected from the group consisting of cysteine/cystine, glutathione/glutathione-oxidized state, ascorbic acid/dehydroascorbate, dithiothreitol/oxidized dithiothreitol, and gallic acid/oxidized gallic acid.

3. The oxygen adapted strain of an anaerobic microorganism of claim 1, wherein a starting condition for said method is a culture medium comprising (a) an oxygen concentration of zero to less than 50 μM, (b) an applied voltage of zero, (c) a high concentration of the anti-oxidant, or (d) a low concentration of the oxidized counterpart, or any combination of (a)-(d).

4. The oxygen adapted strain of an anaerobic microorganism of claim 3, wherein the starting condition is 8 mM cysteine, 0 mM cystine, an applied voltage of 0.1V, an oxygen concentration of zero, or any combination thereof.

5. The oxygen adapted strain of an anaerobic microorganism of claim 3, wherein the oxygen concentration is less than 10 μM.

6. The oxygen adapted strain of an anaerobic microorganism of claim 1, wherein when the antioxidant is cysteine and the anaerobic microorganisms are bacteria, the applied voltage does not exceed 0.6 V, the cysteine concentration is no lower than 3 mM, the cysteine concentration is no higher than 5 mM, and/or a dissolved oxygen concentration in the culture medium is maintained at a sub-lethal concentration, whereby not all bacteria are killed.

7. The oxygen adapted strain of an anaerobic microorganism of claim 1, further comprising

(c) culturing the selected oxygen adapted strain of the anaerobic microorganism under final conditions of applied voltage, oxygen diffusion and anti-oxidant/oxidized counterpart concentration ratio of (a).

8. The oxygen adapted strain of an anaerobic microorganism of claim 1, wherein each step of increasing in (a)(i) and reducing and increasing in (a)(ii) comprises a reinoculation of the anaerobic microorganisms into a new culture medium, thereby producing the oxygen adapted anaerobic microorganism strain.

9. An oxygen adapted microorganism strain according to Claim 1 wherein said microorganism is a *Faecalibacterium prausnitzii* strain selected from the group consisting of *Faecalibacterium prausnitzii* strain DSM 32380, DSM 32378 and DSM 32379.