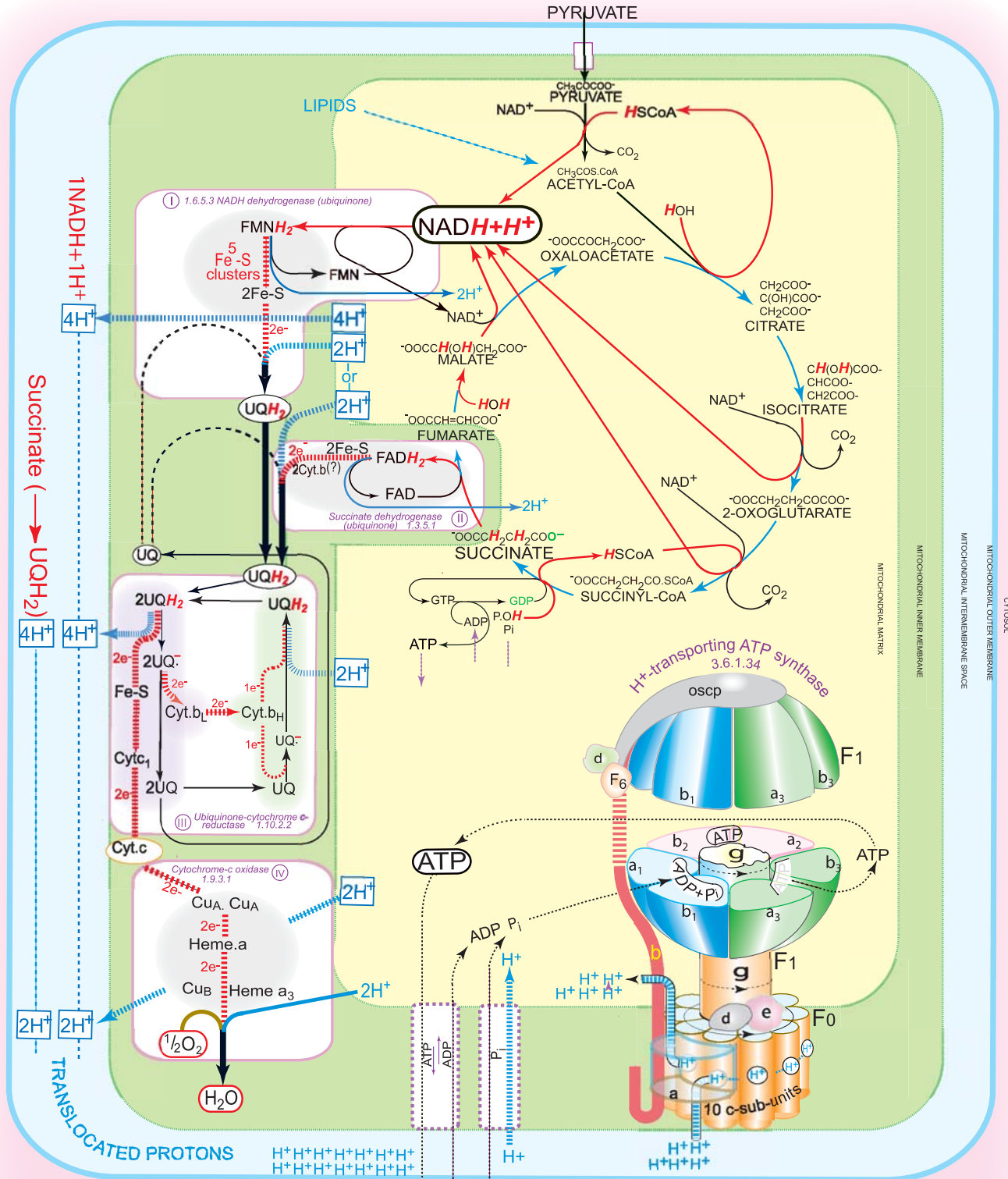


# MITOCHONDRIAL ATP FORMATION



- (2) Electron flow (electric current)
- Source of hydride ions in NADH
- (2) Proton flow
- (2) Proton Translocation from Matrix to Intermembrane space or vice versa

The **g**rotor rotates in three 120° stages within the three (static) **a<sub>1</sub>b<sub>1</sub>**, **a<sub>2</sub>b<sub>2</sub>**, and **a<sub>3</sub>b<sub>3</sub>** subunit pairs in the F<sub>1</sub> complex  
 In each revolution each of these pairs is sequentially activated  
**Stage 1: (Loose)** **a<sub>1</sub>b<sub>1</sub>** binds ADP and Pi **loosely**  
**Stage 2: (Tight)** **a<sub>2</sub>b<sub>2</sub>** binds ADP and Pi **tightly** to form ATP  
**Stage 3: (Open)** **a<sub>3</sub>b<sub>3</sub>** **releases** ATP

Thus 3 ATP is formed from 3ADP+3Pi in each revolution of **g**  
 One revolution of **g** is driven by 10 retro-located protons circulating through 10 c-subunits (- but this may vary)

The design and function of some of the sub-units shown is not yet clear and others (not shown) are a major focus of research