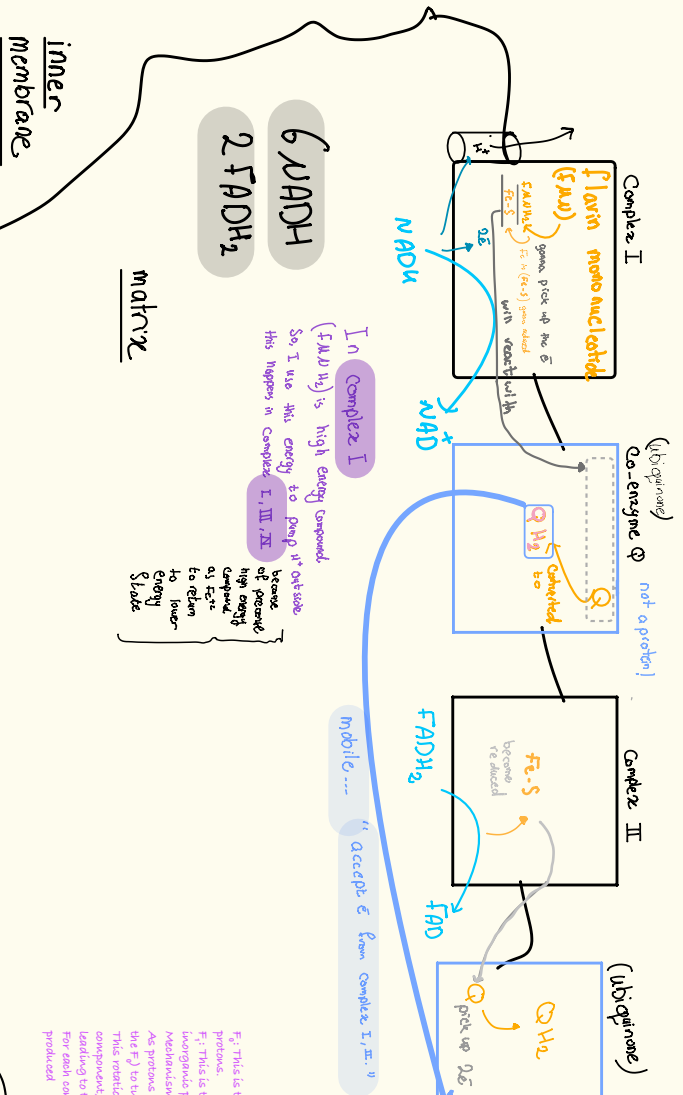


oxidative phosphorylation

— where is it occur?

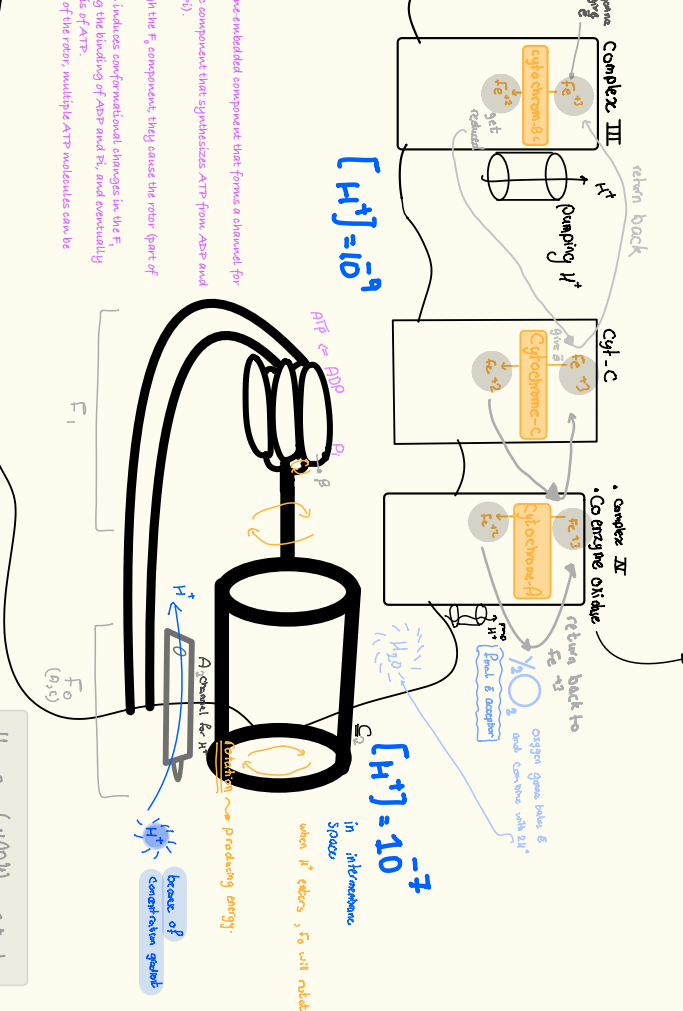
mitochondria (in inner membranes)



• each cytochrome contains heme group.
 Fe^{2+} is the acceptor, converted to Fe^{3+} .
 • electrons transfer from Co-Q to cytochrome bc

the only cytochrome that contains Cu site is Co_{IV}

F_1F_0 This is the membrane-embedded component that forms a channel for protons.
 F_1 : This is the catalytic component that synthesizes ATP from ADP and inorganic phosphate (P_i).
 F_0 : This is the structural component that anchors the F_1 component to the membrane.
 As protons flow through the F_0 component, they cause the rotor (part of the F_1) to turn.
 This rotational motion induces conformational changes in the F_1 component, facilitating the binding of ADP and P_i , and eventually leading to the synthesis of ATP.
 For each complete turn of the rotor, multiple ATP molecules can be produced.



How can (NADH) in cytosol enter the inner membrane of mitochondria?



Complex I \rightarrow Coenzyme-Q \rightarrow Complex II \rightarrow Co enzyme-Q \rightarrow Cytochrome bc \rightarrow Cytochrome c \rightarrow Cytochrome c₁

Complex III \rightarrow mobile \rightarrow Complex IV

The different types of cytochromes in the electron transport chain (ETC) arise from variations in their heme groups and protein structures

In Complex I (FMN is high energy compound. So I use this energy to pump H^+ outside. This happens in Complex I, III, IV)

Complex I (NADH dehydrogenase): $NADH \rightarrow NAD^+$. Electrons from $NADH$ are transferred to **Flavin mononucleotide (FMN)**, which gives up electrons to **ubiquinone (Q)**. Q then reacts with H^+ to form **ubiquinol (QH₂)**. Q is described as a "shuttled" H^+ because it picks up the H^+ from the matrix.

Complex II (succinate dehydrogenase): $FADH_2 \rightarrow FAD$. Electrons from $FADH_2$ are transferred to **Fe-S** clusters, which then transfer electrons to **ubiquinone (Q)**. Q picks up H^+ to form **ubiquinol (QH₂)**.

Complex III (cytochrome bc₁ complex): QH_2 gives up electrons to **cytochromes b_L and b_H**, which then transfer electrons to **cytochromes c₁ and c**. H^+ is pumped from the matrix to the intermembrane space.

Complex IV (cytochrome c oxidase): H^+ is pumped from the matrix to the intermembrane space. Electrons from **cytochrome c** are transferred to **cytochromes a and a₃**, which then transfer electrons to **oxygen**, which combines with H^+ to form H_2O .

Mobile carriers: Ubiquinone (Q) and ubiquinol (QH₂) are mobile carriers that transfer electrons between complexes. Cytochrome c is a mobile electron carrier that transfers electrons from Complex III to Complex IV.

اللهم اقسام لنا من خشيتك ما يحول بيننا وبين مصائبك ومن طاعتك ما يتلفنا ما تكون به علينا مصيبات الدنيا ومتعنا بأسماعنا وابصارنا وقرتنا ما احببنا واجعله الوراثة منا واجعل ثارتنا على من ظلمنا وانصرتنا على من عادانا ولا تجعل مصيبتنا في ديننا ولا تجعل الدنيا اكرهنا ولا مبلغ علمنا ولا تسلط علينا من لا يرحمنا