*Cytochrome Oxidase – A Synthesis*

by M. Wikström, K. Krab and M. Saraste
Academic Press; London, New York, 1981
xii + 198 pages. £14.60

Books featuring cytochrome oxidase as a major topic appear with surprising frequency. The authors of the present volume cite about ten published since 1976, but each represents conference proceedings. Except in one (*Cytochrome Oxidase*) coverage of this enzyme is patchy. Also, human nature being what it is, the interval between conference and publication is often much longer than was originally envisaged. Coverage in this book is thorough and extensive, and though 60 000 words may seem a lot to devote to one enzyme the text is for the most part concise. Publication has been rapid: there are references to numerous works published in 1981. 'Synthesis' in the title is used in a figurative sense – a synthesis of ideas. Though more arresting than, for example, Progress Report, I consider it unfortunate in the title of a discourse on enzyme chemistry.

After two introductory chapters the subject matter can be briefly summarized as follows:

Ch. 3. Purification of cytochrome oxidase; composition of subunits; assembly of subunits in the 7-unit, transmembrane, monomeric complex containing 4 redox centres (2 haem, 2 Cu);
Ch. 4. Structures of haem- and Cu-centres; ligand binding; haem–haem interactions;
Ch. 5. Redox properties of metal centres;
Ch. 6. Catalytic mechanisms and kinetics; reduction of oxygen to water; intermediates between fully oxidized and fully reduced enzyme; role of Cu-centres;
Ch. 7. Dimeric oxidase as foundation of redox-linked, proton-pump mechanisms.

The primary function of cytochrome oxidase is the transfer of electrons from cytochrome *c* to dioxygen. The aims of this book are to explain:

(i) What progress has been made towards understanding how this transfer takes place;
(ii) How this might be linked energetically to a proton pump mechanism.

The authors deserve congratulations for accepting the formidable challenge of preparing a consensus of opinions from the melting pot of ideas on the nature and mechanism of the enzyme.

Though most of this book is clearly written there are lapses. Use of English deteriorates in parts of ch. 3 and in the latter part of ch. 4. Occasional portions of text are missing, or may appear to be missing when the style is obscure. The clearest part of the text is from ch. 5 onwards: this will be the part of major interest to more knowledgeable readers. Greater care in reading of typescript and proofs would have paid dividends. The authors' misuse of words, and sometimes their unlucky choice of prepositions, means that readers will need to pause and study the context for clues. For example: 'imminent' where 'real' was intended, locate (assign), contention (concept), explanation to, normal of. Random interchange of haem *a* and haem A for the one substance is irritating especially because 'a', in various typographic forms, is used for other purposes. 'Data' appear (appears!) in many guises – hard, raw, strong and even hampered – all of which reveal a misunderstanding of a once useful word. Better words were available to the authors in many instances.

These occasional shortcomings do not significantly detract from the authors' achievements. They have produced a very valuable account of the experimental work and the hypothesis-building of recent years. Their own contributions to hypothesis-building will no doubt have their critics. But hypotheses are expendable: their value cannot be measured by their degree of 'rightness' but by the extent to which they provoke fellow workers to initiate new experiments leading to better hypotheses.

E. F. Hartree

Semantic Scholar extracted view of "Cytochrome oxidase : a synthesis" by M. WikstrÃ¶m et al.Â @inproceedings{Wikstrm1981CytochromeO, title={Cytochrome oxidase : a synthesis}, author={M. Wikstr{\"o}m and K. Krab and M. Saraste}, year={1981} }. M. WikstrÃ¶m, K. Krab, M. Saraste. Published 1981. Chemistry. Save to Library. Create Alert. Cite. The enzyme cytochrome c oxidase or Complex IV (PDB 2OCC, EC 1.9.3.1) is a large transmembrane protein complex found in bacteria and the mitochondrion. It is the last enzyme in the respiratory electron transport chain of mitochondria (or bacteria) located in the mitochondrial (or bacterial) membrane. It receives an electron from each of four cytochrome c molecules, and transfers them to one oxygen molecule, converting molecular oxygen to two molecules of water. In the process, it binds four protons from the inner aqueous phase to make water, and in addition translocates four protons across the Cytochrome Oxidase: Subcellular Distribution and Relationship to Nitrogenase Expression in the Nonheterocystous Marine Cyanobacterium Trichodesmium thiebautii. Immunochemical labeling was used to study the subcellular distribution of cytochrome oxidase, a respiratory protein, in Trichodesmium thiebautii. The protein was found associated with both cytoplasmic and thylakoid membranes. About a more.Â  A non significant decline in cytochrome c oxidase (COX) activity was observed in lead acetate treated group. However, triglyceride and phospholipid alterations in brain induced by lead acetate were mitigated in mice co treated with flaxseed extract and also exhibited a significant increase in COX activity. Cytochrome c oxidase. The portion spanning the membrane is shown schematically with green lines. Download high quality TIFF image. Oxygen and Life. Oxygen is an unstable molecule. If given a chance, it will break apart and combine with other molecules.Â Cytochrome c oxidase controls the last step of food oxidation. At this point, the atoms themselves have all been removed and all that is left are a few of the electrons from the food molecules. Cytochrome c oxidase, shown here, takes these electrons and attaches them to an oxygen molecule. Then, a few hydrogen ions are added as well, forming two water molecules. Charging the Battery. The reaction of oxygen and hydrogen to form water is a favorable process, releasing a good deal of energy.

synthesis of cytochrome C oxidase 1provided by HGNC. Primary source. HGNC:HGNC:10603.Â  Mammalian cytochrome c oxidase (COX) catalyzes the transfer of reducing equivalents from cytochrome c to molecular oxygen and pumps protons across the inner mitochondrial membrane. In yeast, 2 related COX assembly genes, SCO1 and SCO2 (synthesis of cytochrome c oxidase), enable subunits 1 and 2 to be incorporated into the holoprotein. This gene is the human homolog to the yeast SCO1 gene. [provided by RefSeq, Jul 2008]. Expression. The enzyme cytochrome c oxidase or Complex IV, EC 1.9.3.1, is a large transmembrane protein complex found in bacteria, archaea, and the mitochondria of eukaryotes. It is the last enzyme in the respiratory electron transport chain of cells located in the membrane. It receives an electron from each of four cytochrome c molecules, and transfers them to one dioxygen molecule, converting the molecular oxygen to two molecules of water. In this process it binds four protons from the inner aqueous phase to Cytochrome c oxidase. The portion spanning the membrane is shown schematically with green lines. Download high quality TIFF image. Oxygen and Life. Oxygen is an unstable molecule. If given a chance, it will break apart and combine with other molecules.Â  Cytochrome c oxidase controls the last step of food oxidation. At this point, the atoms themselves have all been removed and all that is left are a few of the electrons from the food molecules. Cytochrome c oxidase, shown here, takes these electrons and attaches them to an oxygen molecule. Then, a few hydrogen ions are added as well, forming two water molecules. Charging the Battery. The reaction of oxygen and hydrogen to form water is a favorable process, releasing a good deal of energy. Evidence for cytochrome oxidase subunit I and a cytochrome c-subunit II fused protein in the cytochrome â€˜c 1aa 3â€™ of Thermus thermophilus. How old is cytochrome oxidase? Eur.Â  Cytochrome Oxidase. A Synthesis. London: Academic Press.Google Scholar. WikstrÃ¶m, M., Saraste, M. & PenttilÃ¤, T. (1985). (mitochondrial biogenesis/protein synthesis in vitro/cytochrome c oxidase subunits). Robert 0. poyton* and gert s. p. groott. * Department of Microbiology, University of Connecticut Health Center, Farmington, Conn.Â  The ability of these isolated mitochondria to synthesize "native" polypeptides was assessed by examin-ing the incorporation of label into subunits of cytochrome c oxidase (EC 1.9.3.1). An analysis of immunoprecipitates formed by incubating cholate extracts of labeled mito-chondria with an antiserum against holocytochromne c oxidase revealed that label was incorporated into three polypeptides of sizes equivalent to those of cytochrome c oxidase subunits I, II, and III, shown from earlier studies in vivo to be translated on mitochondrial ribo-somes.