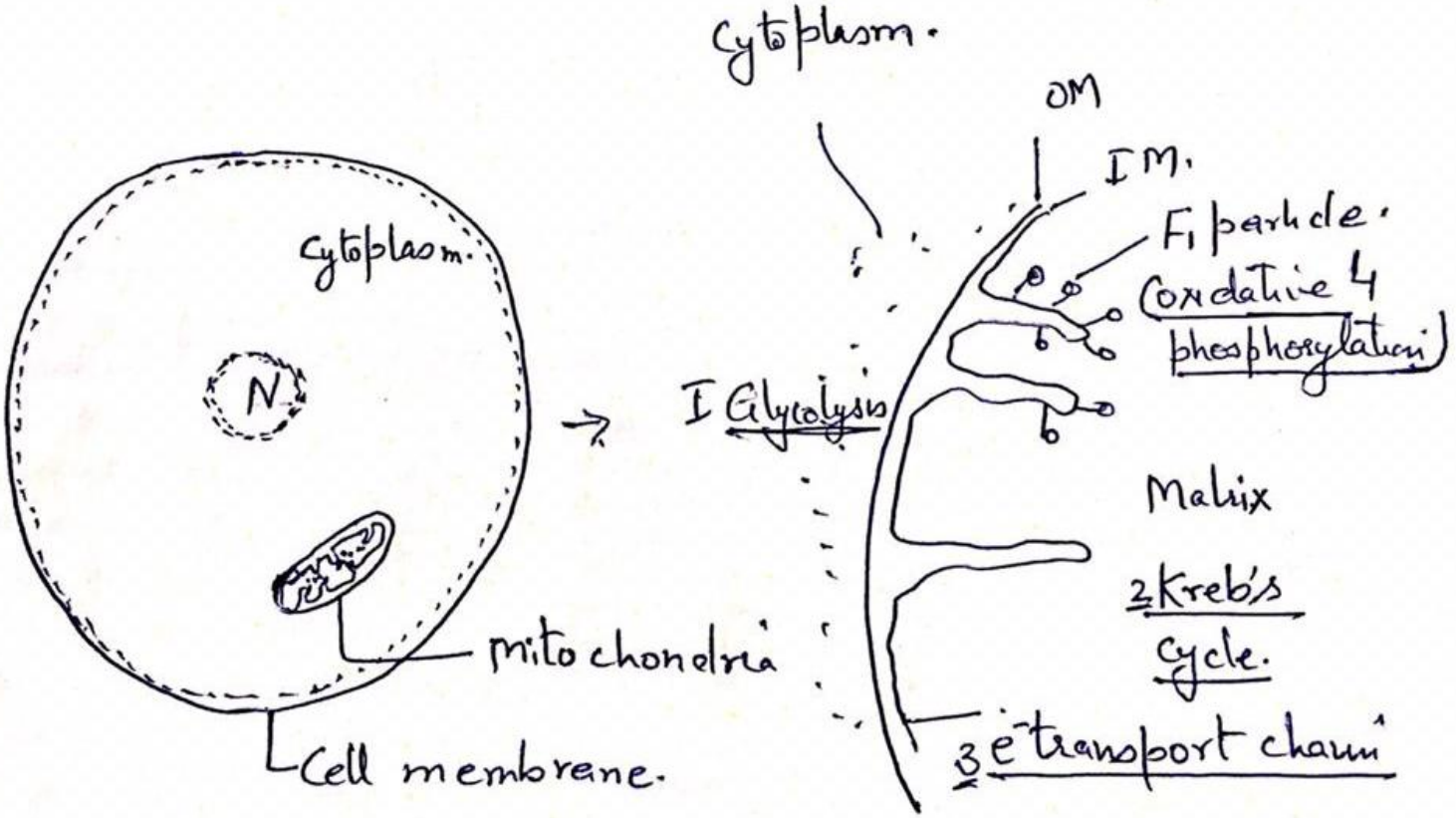
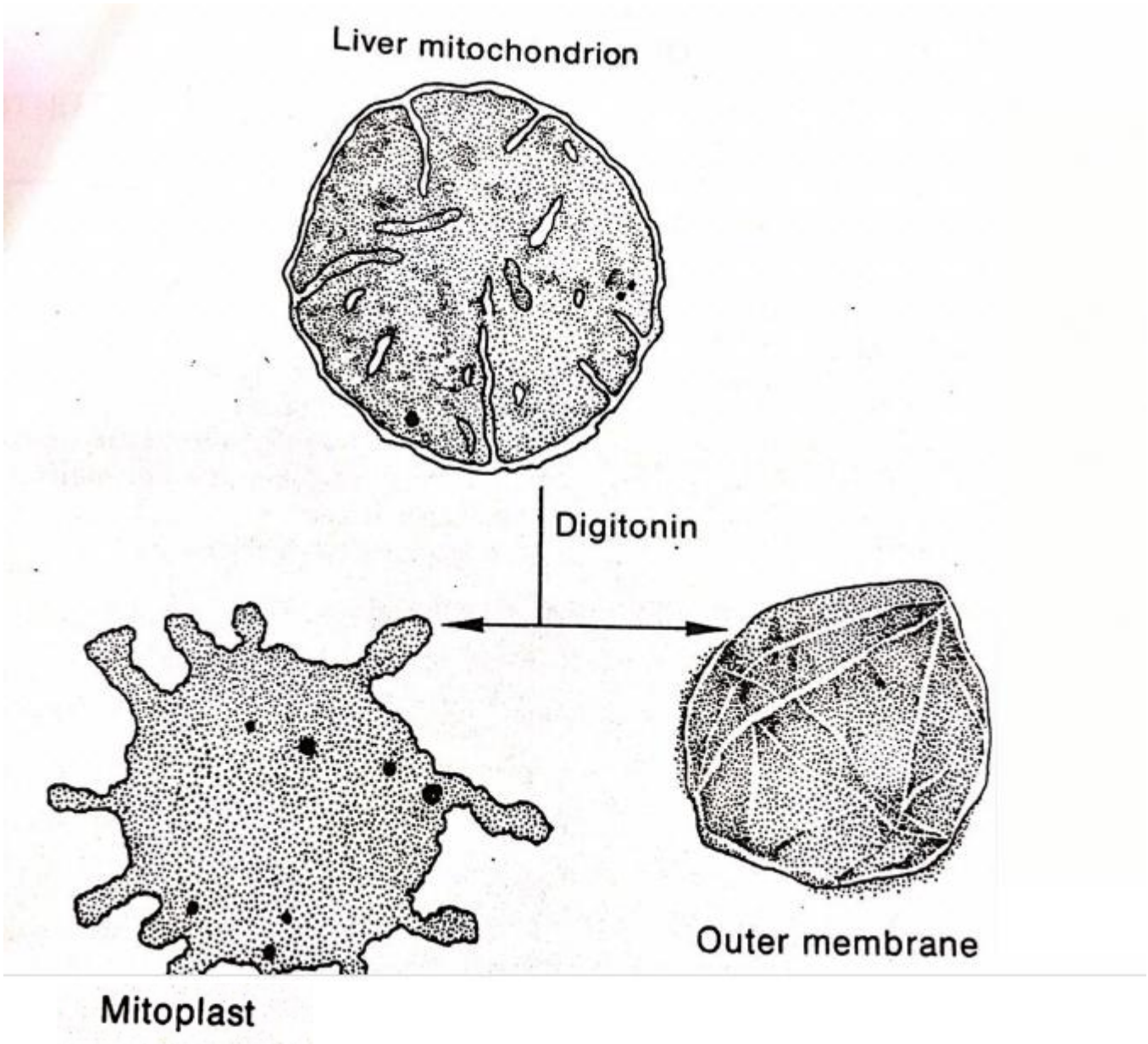

Cytoplasm.
N
mitochondria
Cell membrane.
Cytoplasm.
OM
IM.
F1 particle.
Oxidative phosphorylation
I Glycolysis
Matrix
2 Kreb's Cycle.
3 e⁻ transport chain


Liver mitochondrion
Digitonin
Outer membrane
Mitoplast

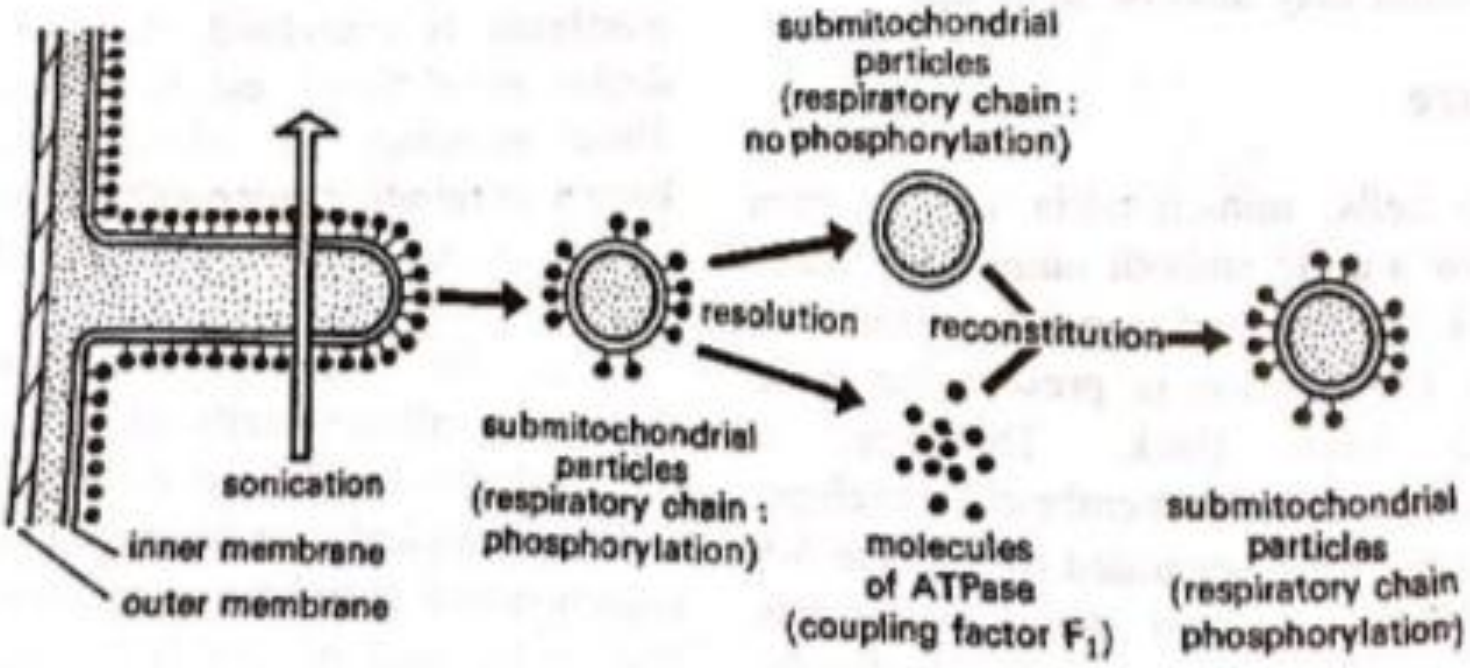
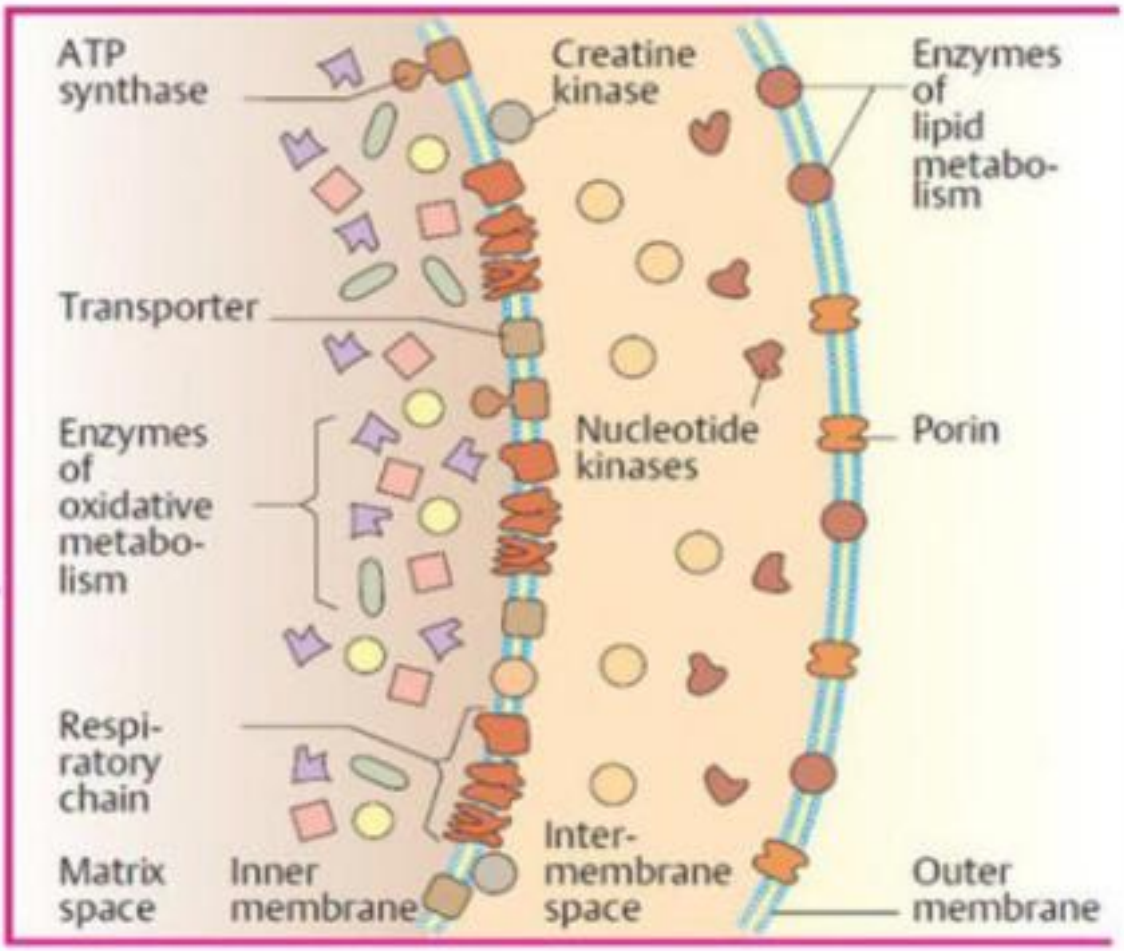


Fig. 9.6. A diagrammatic representation showing the role of oxysomes in submitochondrial particles.


ATP synthase
Creatine kinase
Enzymes of lipid metabo-lism
Transporter
Enzymes of oxidative metabo-lism
Nucleotide kinases
Porin
Respi-ratory chain
Matrix space
Inner membrane
Inter-membrane space
Outer membrane

noun, plural: marker enzymes

Any enzyme confined to a particular organelle, cell, or cellular component

Supplement

Marker enzymes are enzymes, which are not ubiquitous but confined to a specific type of organelle, a subcomponent, or a cell. Since marker enzymes are not to be found just anywhere else, their detection can indicate the presence of the source whereas their absence means the lack of that source.

Marker enzymes are one of the cell biomarkers used to characterize a cell type. They are also used in the isolation of the target cellular component.

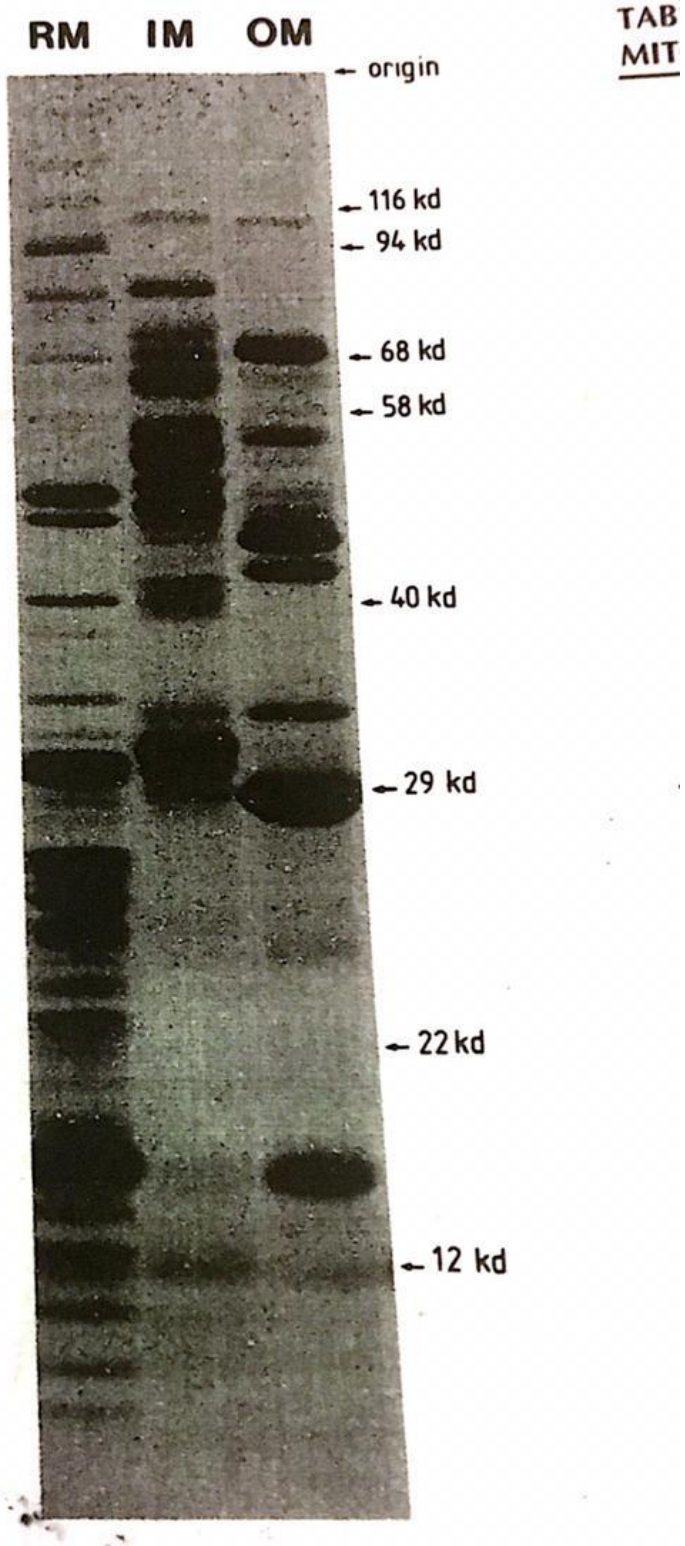


Fig. 11–7. SDS polyacrylamide gel showing the different polypeptides present in the rough ER (RM), inner mitochondrial membrane (IM), and outer mitochondrial membrane (OM). Observe that the bands in the OM differ from those in the other membranes. The 29 Kd porin is the major protein in the OM. (Courtesy of H. Reizman, G. Schatz and colleagues.)

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TABLE 11–3. ENZYME DISTRIBUTION IN MITOCHONDRIA

Outer membrane
- Monoamine oxidase
- Rotenone-insensitive NADH-cytochrome-c reductase
- Kynurenine hydroxylase
- Fatty acid CoA ligase

Space between outer and inner membranes
- Adenylate kinase
- Nucleoside diphosphokinase

Inner membrane
- Respiratory chain enzymes
- ATP synthetase
- Succinate dehydrogenase
- β-Hydroxybutyrate dehydrogenase
- Carnitine fatty acid acyl transferase

Matrix
- Malate and isocitrate dehydrogenases
- Fumarase and aconitase
- Citrate synthetase
- α-Keto acid dehydrogenases
- β-Oxidation enzymes

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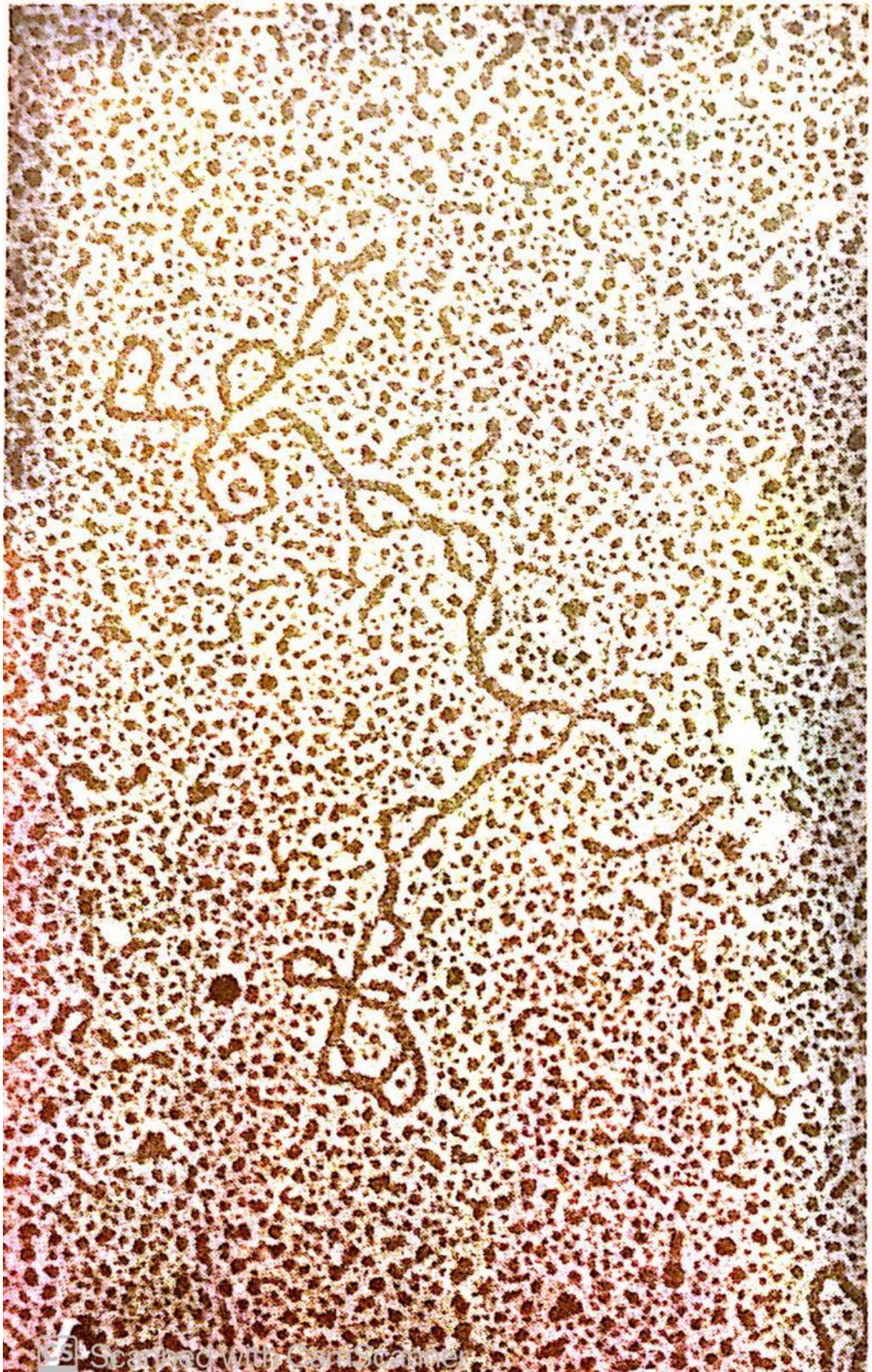

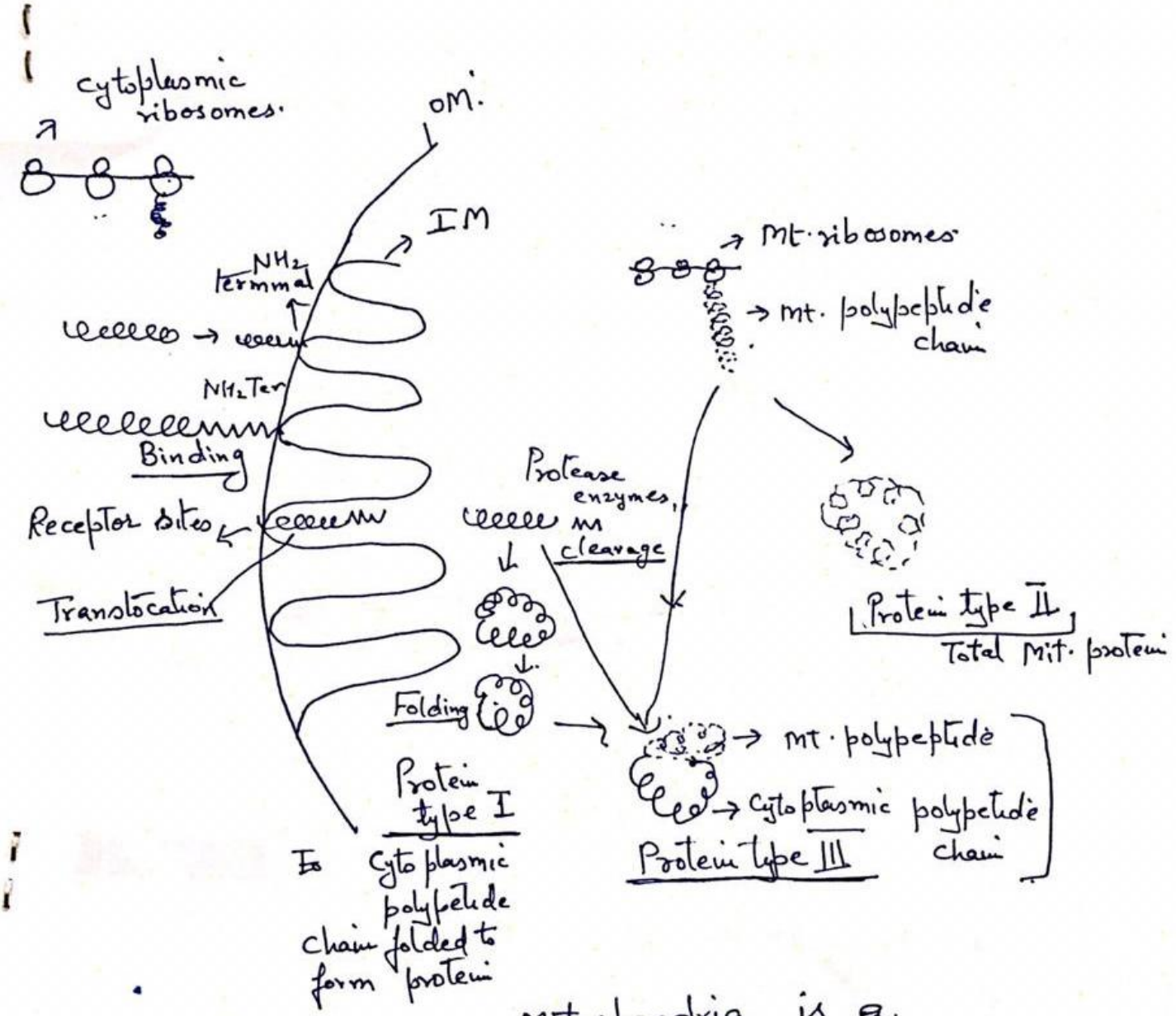

Mitochondria is a Semiautonomous organelle.

TABLE 11–4. ENZYME ACTIVITY OF VARIOUS MITOCHONDRIAL COMPONENTS

Component	Inner Membrane	Outer Membrane	Matrix	Outer Chamber
Enzyme marker	Cytochrome oxidase	Monoamine oxidase	Malate dehydrogenase	Adenylate kinase
Specific activity of marker in component	9315	551	3895	6690
Specific activity in whole mitochondria	1980	22	2608	421
% Protein in component	21.3	4.0	66.9	6.3

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From Schnaitman, C.A., and Greenawalt, J.W.: J. Cell Biol., *38*:158, 1968.

https://www.youtube.com/watch?v=CVs4WLdQDco&feature=share

4:05 PM