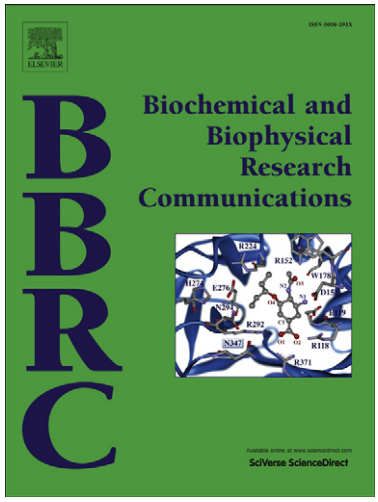

Historical Review

Getting mitochondria to center stage

Gottfried Schatz

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Getting mitochondria to center stage

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ABSTRACT

The question of how eukaryotic cells assemble their mitochondria was long considered to be inaccessible to biochemical investigation. This attitude changed about fifty years ago when the powerful tools of yeast genetics, electron microscopy and molecular biology were brought to bear on this problem. The rising interest in mitochondrial biogenesis thus paralleled and assisted in the birth of modern biology. This brief recollection recounts the days when research on mitochondrial biogenesis was an exotic effort limited to a small group of outsiders.

Ever since mitochondria were discovered in 1857 by the Swiss anatomist Rudolf Albrecht von Kölliker, described more detail in 1890 by the German pathologist Richard Altman, and given their present name by the German anatomist Carl Benda in 1898 (1-4), their relationship to the cell that housed them has engendered intense debate. Were mitochondria intracellular parasites (4), highly adapted endosymbionts similar to the autonomously replicating chloroplasts (5, 6), or just another type of intracellular organelle like the cell membrane or the nucleus? The American biologists Ivan E. Wallin (7) and Lynn Margulies (then named Lynn Sagan; 8) had re-emphasized various forms of the endosymbiotic theory, but when I stumbled into the world of research in the early sixties, few biochemists seemed to give this important problem much thought. At that time, the ultrastructure of mitochondria, the composition and organization of their respiratory chain and many of their key metabolic pathways were already known and most “mitochondriacs” were fiercely determined to be the first in unraveling the