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Nota di contenuto	Front matter -- Preface -- Tracey A. Rouault biography -- Contents -- Contributing authors -- 1. Iron-sulfur proteins: a historical perspective / Bonomi, Francesco / Rouault, Tracey A. -- 2. Chemistry of iron-sulfur clusters / Ichiye, Toshiko -- 3. Quantitative interpretation of EPR spectroscopy with applications for iron-sulfur proteins / Petasis, Doros

T. / Hendrich, Michael P. -- 4. The utility of Mössbauer spectroscopy in eukaryotic cell biology and animal physiology / Chakrabarti, Mrinmoy / Lindahl, Paul A. -- 5. The interstitial carbide of the nitrogenase M-cluster: insertion pathway and possible function / Hu, Yilin / Ribbe, Markus -- 6. The iron-molybdenum cofactor of nitrogenase / Spatzal, Thomas / Andrade, Susana L. A. / Einsle, Oliver -- 7. Biotin synthase: a role for iron-sulfur clusters in the radical-mediated generation of carbon-sulfur bonds / Jarrett, Joseph T. -- 8. Molybdenum-containing iron-sulfur enzymes / Hille, Russ -- 9. The role of iron-sulfur clusters in the biosynthesis of the lipoyl cofactor / Lanz, Nicholas D. / Booker, Squire J. -- 10. Iron-sulfur clusters and molecular oxygen: function, adaptation, degradation, and repair / Nicolet, Yvain / Fontecilla-Camps, Juan C. -- 11. A retrospective on the discovery of [Fe-S] cluster biosynthetic machineries in Azotobacter vinelandii / Dos Santos, Patricia C. / Dean, Dennis R. -- 12. A stress-responsive Fe-S cluster biogenesis system in bacteria - the suf operon of Gammaproteobacteria / Outten, F. Wayne -- 13. Sensing the cellular Fe-S cluster demand: a structural, functional, and phylogenetic overview of Escherichia coli IscR / Mettert, Erin L. / Perna, Nicole T. / Kiley, Patricia J. -- 14. Fe-S assembly in Gram-positive bacteria / Dos Santos, Patricia C. -- 15. Fe-S cluster assembly and regulation in yeast / Pain, Debkumar / Dancis, Andrew -- 16. The role of Fe-S clusters in regulation of yeast iron homeostasis / Outten, Caryn E. -- 17. Biogenesis of Fe-S proteins in mammals / Rouault, Tracey A. -- 18. Iron-sulfur proteins and human diseases / Tong, Wing-Hang -- 19. Connecting the biosynthesis of the molybdenum cofactor, Fe-S clusters, and tRNA thiolation in humans / Leimkühler, Silke -- 20. Iron-sulfur proteins and genome stability / Gari, Kerstin -- 21. Eukaryotic iron-sulfur protein biogenesis and its role in maintaining genomic integrity / Lill, Roland / Uzarska, Marta A. / Wohlschlegel, James -- 22. Iron-sulfur cluster assembly in plants / Ye, Hong -- 23. Origin and evolution of Fe-S proteins and enzymes / Boyd, Eric S. / Schut, Gerrit J. / Shepard, Eric M. / Broderick, Joan B. / Adams, Michael W. W. / Peters, John W. -- Index

Sommario/riassunto

This volume on iron-sulfur proteins includes chapters that describe the initial discovery of iron-sulfur proteins in the 1960's to elucidation of the roles of iron sulfur clusters as prosthetic groups of enzymes, such as the citric acid cycle enzyme, aconitase, and numerous other proteins, ranging from nitrogenase to DNA repair proteins. The capacity of iron sulfur clusters to accept and delocalize single electrons is explained by basic chemical principles, which illustrate why iron sulfur proteins are uniquely suitable for electron transport and other activities. Techniques used for detection and stabilization of iron-sulfur clusters, including EPR and Mossbauer spectroscopies, are discussed because they are important for characterizing unrecognized and elusive iron sulfur proteins. Recent insights into how nitrogenase works have arisen from multiple advances, described here, including studies of high-resolution crystal structures. Numerous chapters discuss how microbes, plants, and animals synthesize these complex prosthetic groups, and why it is important to understand the chemistry and biogenesis of iron sulfur proteins. In addition to their vital importance in mitochondrial respiration, numerous iron sulfur proteins are important in maintenance of DNA integrity. Multiple rare human diseases with different clinical presentations are caused by mutations of genes in the iron sulfur cluster biogenesis pathway. Understanding iron sulfur proteins is important for understanding a rapidly expanding group of metabolic pathways important in all kingdoms of life, and for understanding processes ranging from nitrogen fixation to human

disease.