called Cas9 that was originally identified in prokaryotes that can be used together with guide RNAs called CRISPRs to selectively alter or correct DNA sequences, such as disease-causing mutations. While iPS cells and Cas9 technology hold considerable promise, whether they are the Holy Grail of tissue regeneration remains to be seen.

Concluding Remarks. This survey of selected topics in cell biology will serve as a basis for our later discussions of pathology, and we will refer back to it throughout the book. Students should, however, remember that this summary is intentionally brief, and more information about some of the fascinating topics reviewed here can be readily found in textbooks devoted to cell and molecular biology.

SUGGESTED READINGS

Genetics and Epigenetics

Cech TR, Steitz JA: The noncoding RNA revolution—trashing old rules to forge new ones. *Cell* 157:77, 2014. [*An excellent review of the roles played by non- coding RNAs.*]

Hübner MR, Eckersley-Maslin MA, Spector DL: Chromatin organization and transcriptional regulation. *Curr Opin Genet Dev* 23:89, 2013. [*Nice discussion of genome organization and chromatin structure-function relationships that regulate cell type-specific nuclear transcription.*]

Jarovcevski M, Akbarian S: Epigenetic mechanisms in neurologic disease. *Nat Med* 18:1194, 2012. [*A well-written overview of genomic organization and transcriptional regulation, with a specific focus on neurologic disease.*]

Teperino R, Lempradl A, Pospisilik JA: Bridging epigenomics and complex disease: the basics. *Cell Mol Life Sci* 70:1609, 2013. [*An introductory review of the epigenetic basis for human disease.*]

Wang KC, Chang HY: Molecular mechanisms of long noncoding RNAs. *Mol Cell* 43:904, 2011. [*Excellent review examining the rapidly expanding universe of long non-coding RNA species, with discussion of their form and function, and roles as signal transducers.*]

Cellular Housekeeping

Andersson ER: The role of endocytosis in activating and regulating signal transduction. *Cell Mol Life Sci* 69:1755, 2011. [*Overview of endocytosis with specific emphasis on its role in modulating intracellular signaling.*]

Choi AM, Ryter SW, Levine B: Autophagy in human health and disease. *N Eng J Med* 368:651, 2013. [*Superb review concerning the physiologic and pathophysiologic aspects of autophagy.*]

English AR, Zurek N, Voeltz GK: Peripheral ER structure and function. *Curr Opin Cell Biol* 21:596, 2009. [*Overview of the structural and functional organization of the endoplasmic reticulum and its relationship to other cellular organelles.*]

Guillot C, Lecuit T: Mechanics of epithelial tissue homeostasis and morphogenesis. *Science* 340:1185, 2013. [*Topical discussion about cellular interactions and the mechanical basis of tissue maintenance.*]

Simons K, Sampaio JL: Membrane organization and lipid rafts. *Cold Spring Harb Perspect Biol* 3:1, 2013. [*Nice review of the general principles of membrane architecture and emphasizing domain organization.*]

Wong E, Cuervo AM: Integration of clearance mechanisms: the proteasome and autophagy. *Cold Spring Harb Perspect Biol* 2:1, 2010. [*Overview of intracellular degradation pathways, specifically focusing on the elimination of aberrant or abnormal constituents.*]

Cellular Metabolism and Mitochondrial Function

Dang CV: Links between metabolism and cancer. *Genes Dev* 26:877, 2012. [*An excellent review on metabolic functions of mitochondria.*]

Kushnareva Y, Newmeyer DD: Bioenergetics and cell death. *Ann NY Acad Sci* 1201:50, 2010. [*Overview of the mitochondrial outer membrane permeabilization and its role in apoptosis and bioenergetics*].

Tait SW, Green DR: Mitochondria and cell death: outer membrane permeabilization and beyond. *Nat Rev Mol Cell Biol* 11:621, 2010. [*Review of the role of mitochondria in cell death pathways.*]

Cellular Activation

Deupi X, Kobilka B: Activation of G protein-coupled receptors. *Adv Protein Chem* 74:137, 2007. [*Good overview of the fundamental mechanisms of the activation of these receptors.*]

Duronio RJ, Xiong Y: Signaling pathways that control cell proliferation. *Cold Spring Harb Perspect Biol* 5:1, 2013. [*Excellent overall review of cell signaling and proliferation.*]

Morrison DK: MAP kinase pathways. *Cold Spring Harb Perspect Biol* 4:1, 2012. [*Review of mitogen-activated kinase signaling pathways.*]

Perona R: Cell signalling: growth factors and tyrosine kinase receptors. *Clin Transl Oncol* 8:77, 2011. [*Update on signaling pathways with an emphasis on how these become dysregulated in malignancy.*]

Maintaining Cell Populations

Alvarado AS, Yamanaka S: Rethinking differentiation: stem cells, regeneration, and plasticity. *Cell* 157:110, 2014.

Fuchs E, Chen T: A matter of life and death: self-renewal in stem cells. *EMBO Rep* 14:39, 2013. [*Scholarly review on the conceptual framework and experimental underpinnings of our understanding regarding stem cell renewal, using cutaneous stem cells as a paradigm.*]

Li M, Liu GH, Izpisua-Belmonte JC: Navigating the epigenetic landscape of pluripotent stem cells. *Nat Rev Mol Cell Biol* 13:524, 2012. [*Good discussion of the epigenetic regulation of stem cell proliferation and subsequent differentiation.*]