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This monograph has the ambitious aim of developing a mathematical theory of complex biological systems with special attention to the phenomena of ageing, degeneration and repair of biological tissues under individual self-repair actions that may have good potential in medical therapy.

The approach to mathematically modeling biological systems needs to tackle the additional difficulties generated by the peculiarities of living matter. These include the lack of invariance principles, abilities to express strategies for individual fitness, heterogeneous behaviors, competition up to proliferative and/or destructive actions, mutations, learning ability, evolution and many others.

Applied mathematicians in the field of living systems, especially biological systems, will appreciate the special class of integro-differential equations offered here for modeling at the molecular, cellular and tissue scales. A unique perspective is also presented with a number of case studies in biological modeling.