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Editorial

Tissue mechanics

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Mechanical constraints are recognized as a key regulator of biological processes, from molecules to organisms, throughout embryonic development, tissue regeneration and in situations of physiological regulation and pathological disturbances. The study of the influence of these physical constraints on living tissues, in particular on cells, and on organisms of the plant and animal kingdoms, has been the object for a decade of important works carried out at the interface between biology, physics and mechanics, constituting a new discipline:*mechanobiology*.

Tissues are living complex systems composed of a large number of cells, which confer to them their out-of-equilibrium behaviour. Cells within tissues exhibit heterogeneous properties in terms of shape, adhesion and dynamics. Such active materials give rise to emergent properties that include phase transitions, active turbulence and active nematic structures. The dynamics of multicellular assemblies thus rely on mechanical properties that often differ from the ones observed in passive materials and instruct biological functions such as growth, migration and assembly.

This Topical Issue presents a collection of contributions at the cutting edge of research in tissue mechanics.

The rich variety of subjects—epithelia submitted to different mechanical, geometrical or topological constraints, collective and cellular dynamics in cell clusters and organoids, embryology, theory of active motions mediated by topological defects, new methods of analysis—reflects the current intense activity of the biophysics community in this domain.

We hope that these contributions will build a bridge between these fundamental approaches and will present the impact of physical principles on the regulation of biological tissues.

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