

## From balls and springs to colonies and tissues A theoretical biophysicist's perspective

Biological tissues are the ultimate complex materials, with many layers of organization, containing both passive and active components. Due to this underlying complexity, they exhibit emergent behavior: the tissues are much more than just the sum of their parts. To understand how this emergent behavior comes about, a tissue-level theory won't suffice. Instead, we have to construct tissues from simpler elements, and study how these simple elements behave collectively. For the simple elements themselves, we use time-honored systems from physics: spheres, springs, diffusion, and drag. Combining them, we can study behavior in a wide range of systems, such as crawling and dividing cells, developing tissues, and even bacterial colonies that go to war.