

## Free Boundary Problems Arising in Biology

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In a free boundary problem one seeks to solve a system of PDEs in a domain  $G$  whose boundary, or a part of it, is unknown, and to also determine the free boundary. Classical free boundary problems include contact problems in elasticity, melting of ice, propagation of jets, and cavitation flows. In recent years new free boundary problems arose in the context of biological or biomedical processes. Examples include the healing of a wound, the growth of a tumor, the formation of a plaque in the artery (atherosclerosis) which leads to a heart attack or a stroke, the development of granulomas in tuberculosis, abdominal aorta aneurysm, and biofilms. In this talk I will briefly describe these biological problems, introduce their mathematical models, and display simulations of the models and their biological significance. Finally, I will review rigorous mathematical results for the PDE models, and state open problems.