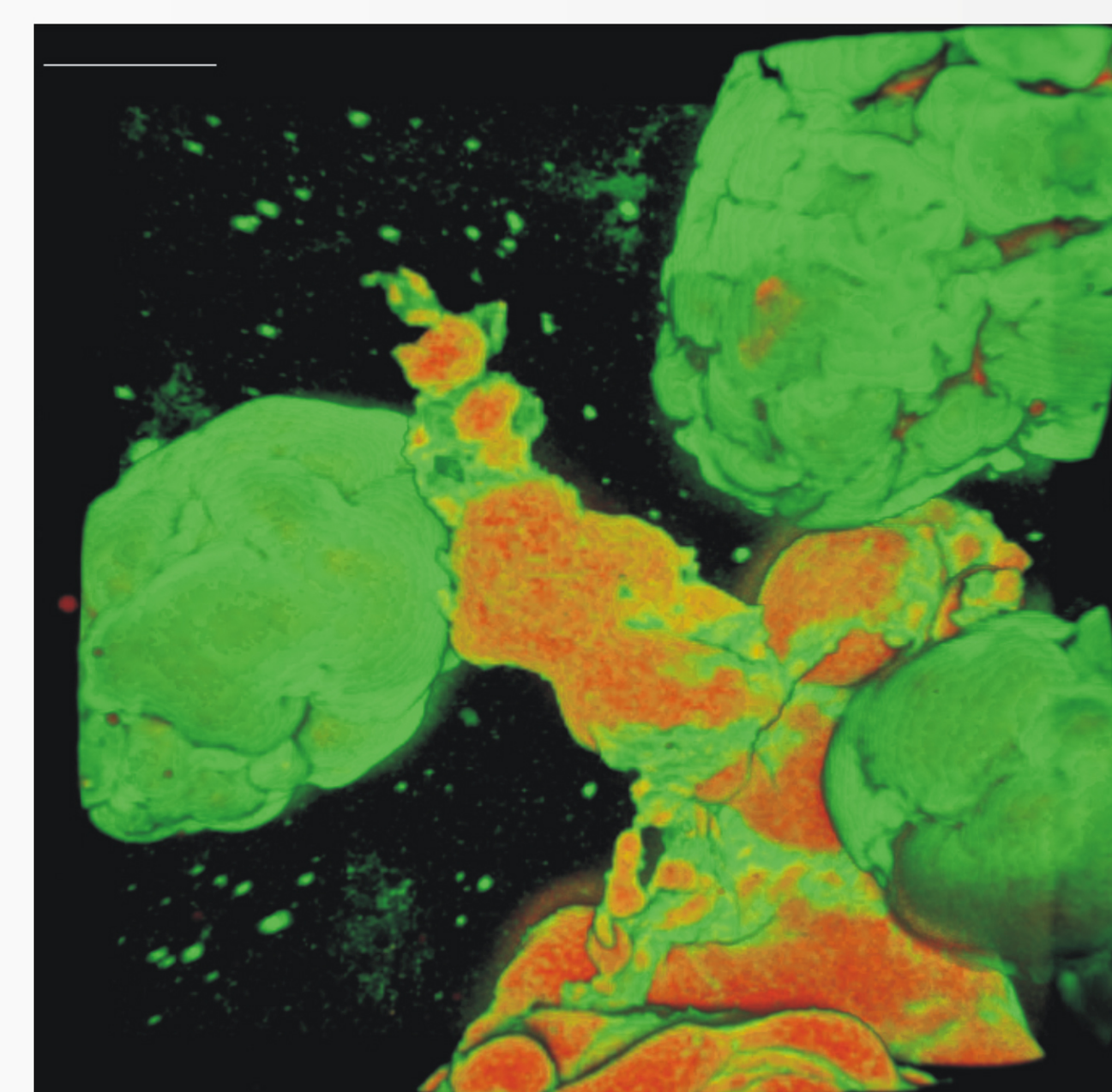
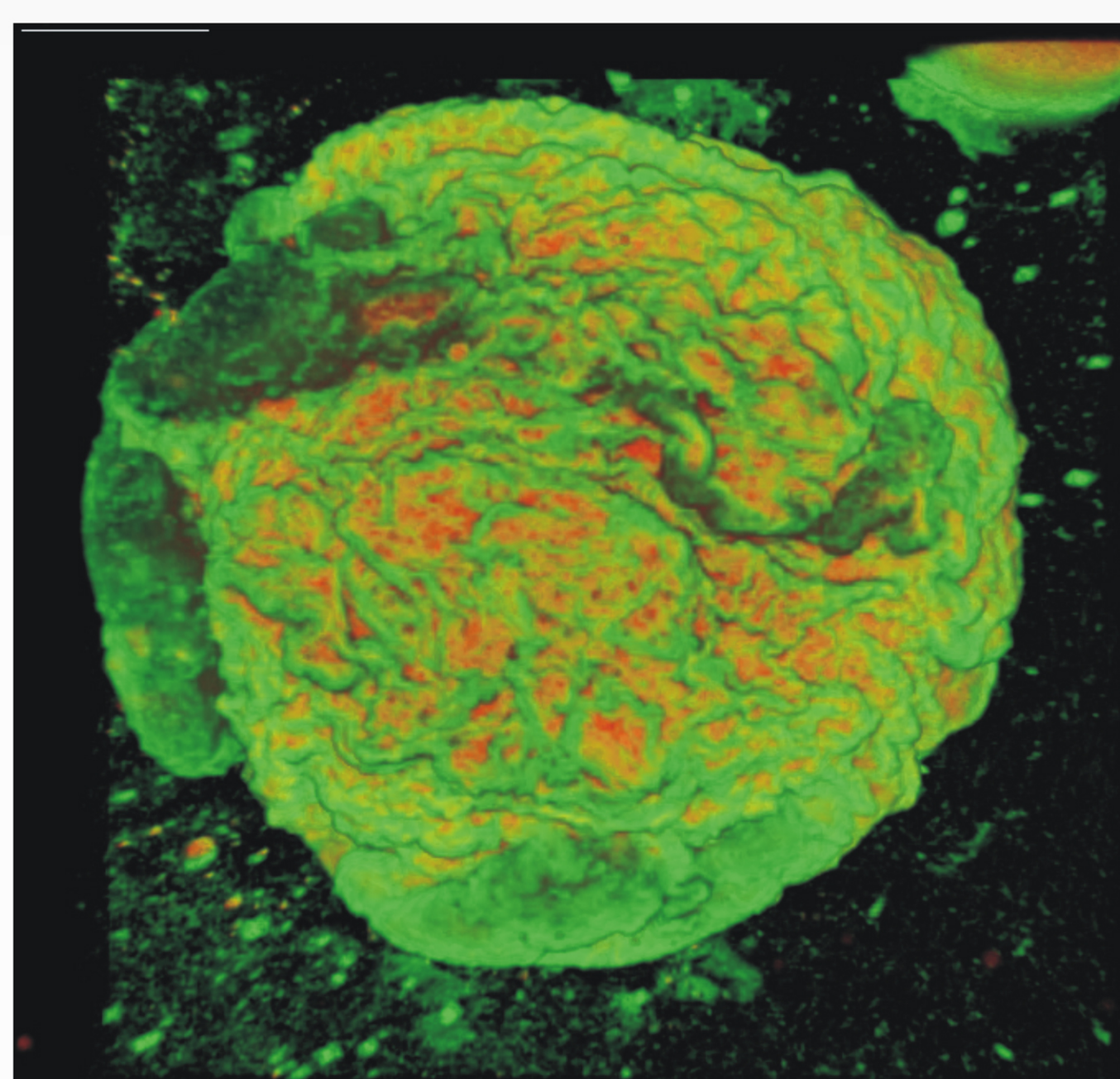
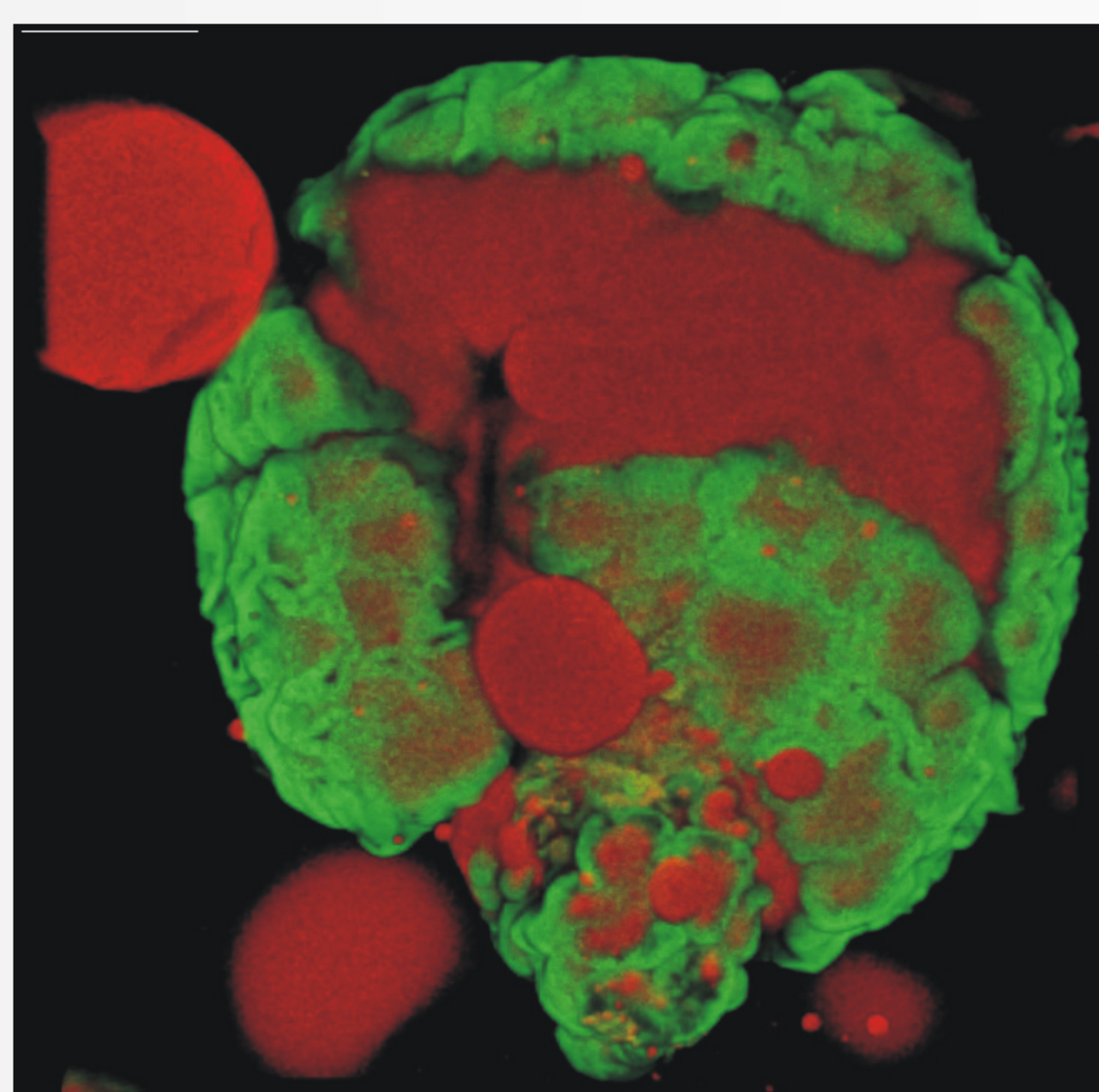


# Buckling of biofilm-coated oil droplets

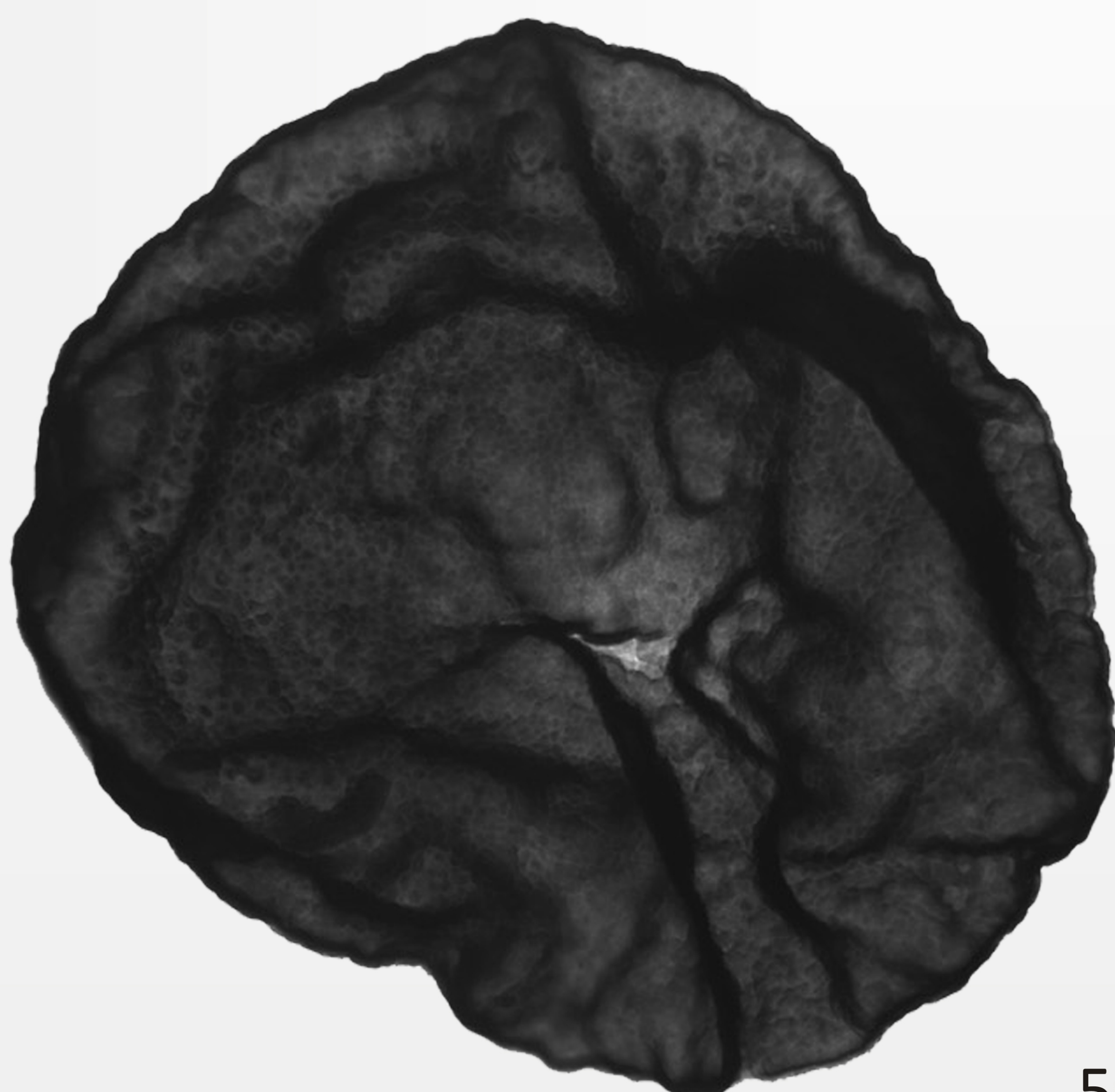
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*Marinobacter hydrocarbonoclasticus* thrives in the coastal waters of the Mediterranean sea and loves crude oil, both physically and biochemically. These bacteria adhere to oil droplets and consume hydrocarbon molecules by deploying membrane-bound or diffusible enzymes and biosurfactants. Over time, the surface-attached bacteria grow and release their progeny and high-molecular-weight biopolymers, which form an elastic biofilm coat over the droplet. Intrabiofilm compressive stresses develop due to active biofilm growth and shrinkage of the oily droplet core. The lateral components of these stresses relax through buckling instabilities and create crumpled particles, as shown below. Under long-term limitation of nitrogen and phosphorus, bacterial activities attenuate, the exopolymer matrix becomes disrupted, and the outer layer of the biofilm coat sheds from the oily core. [Project H2020 MSCA 741799]

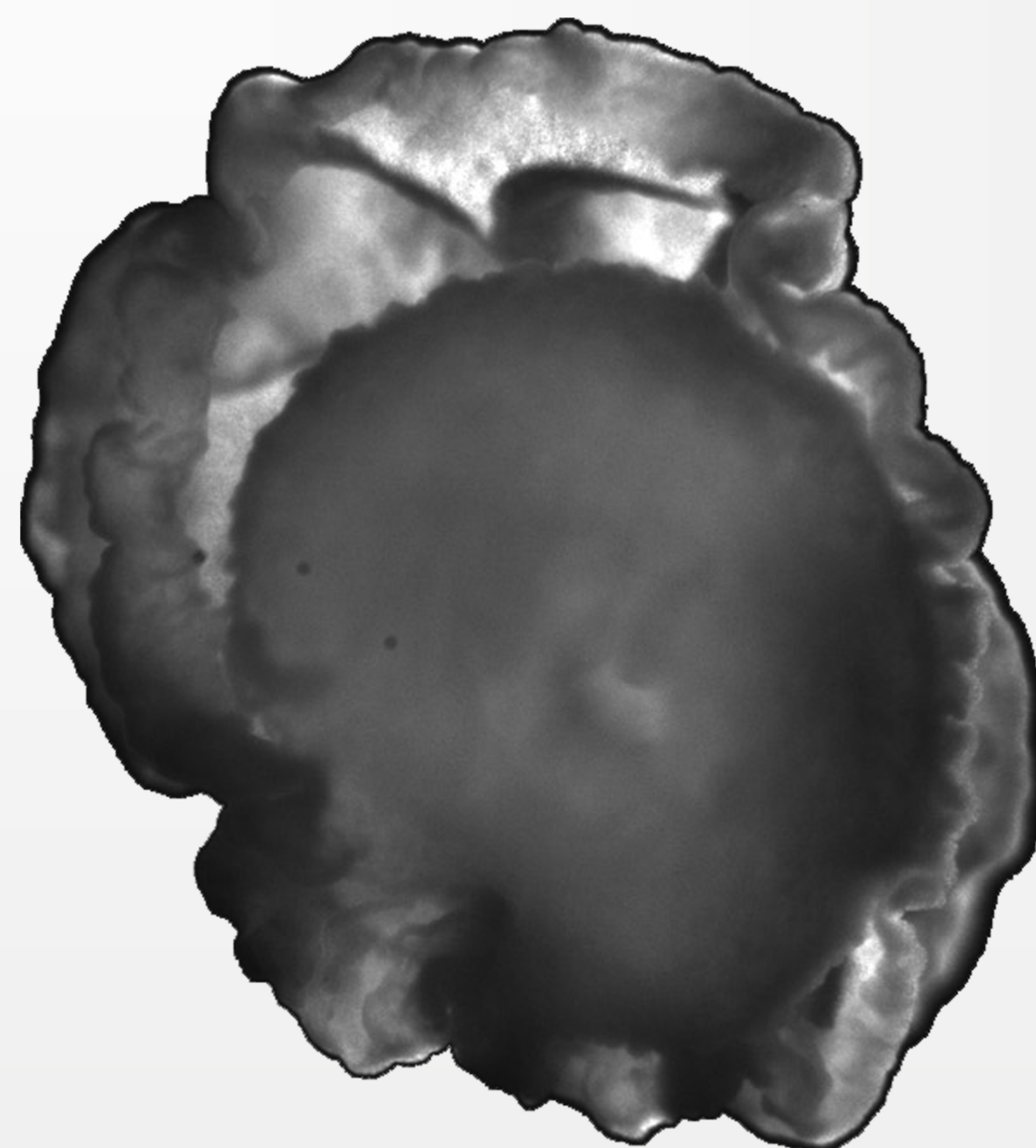


**Confocal images of crumpled biofilm-coated hydrocarbon droplets;**  
oil shown in red and biofilm in green pseudocolors.



**Bright field image of  
a crumpled biofilm-coated droplet.**

500  $\mu$ m



**Dark field image of a biofilm-coated  
droplet shedding its old crumpled coat.**