An ingestible lab-on-a-pill device capable of sampling the gut microbiome in vivo is shown, as described in article number 1900053 by Sameer R. Sonkusale and co-workers. The lab-on-a-pill uses an osmotic pump to acquire the sample in the embedded microfluidic channels. It operates without a battery or any electronic components. A magnet enables tracking and spatial localization. Detailed in vivo studies in pigs and primates validate the performance of the pill.