**Supplementary information**

**Materials and Methods**

**1. Evaluation of the ability of LSs to penetrate across intestinal epithelium**

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| **Fig S1.** **Schematic illustrating processing of mouse intestine for ex vivo confocal imaging.** |

In order to verify that the confocal microscope is an efficient technique to look through the intestinal tissue to visualize LSs and pinpoint their location within the tissue, a naïve mouse was sacrificed, its intestine was isolated, cleaned, cut in to small pieces, LSs were intentionally sprinkled either on serosal surface or villous epithelial surface, and sandwiched between the glass slide and cover slip (**Fig S1**). Confocal microscope was then used to assess whether LSs applied on either surfaces could be visualized using the microscope. Depending on whether LSs were sprinkled on serosal or epithelial surface, they should be visible only on one side of the tissue. Although LSs are naturally fluorescent and emit over a broad spectrum ranging from UV to red wavelengths, they were more clearly visible under TRITC (570 nm) filter, and hence this filter was selected for visualizations. The LSs were first located using a lower magnification (10x) and then an image was taken at a higher magnification (60x) to clearly visualize the pollen structure. As seen in supplementary **Fig S2-top row**, when LSs are applied only on villous epithelium, they can be readily detected when the confocal microscope is focused closer to the villous-surface cover slip. However, farther away from the villous epithelium, no LSs were detected, either within the tissue or close to the serosal surface. Similarly, when LSs were applied only on serosal surface, no LSs were detected closer to the cover slip or within the tissue, and were only seen when the microscope was focused closer to the glass slide **(Fig S2-bottom row)**. This demonstrates the ability of the confocal microscopy technique to visualize LSs in the tissue sandwich, and to discriminate the location of the LSs on the villous epithelium and the serosal surface of the intestinal tissue.

Next, to study the potential of LSs to translocate in to intestinal wall, mice (n=3) were fed LSs, and 24 h later parts of their intestine (after washing) were imaged as described above. Supplementary **Fig S3** shows the representative intestinal sections for mouse 2 and 3, wherein LSs are observed in the intestinal wall, demonstrating their penetration.

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| **Fig S2.** **Confocal microscopy can discriminate between LSs present on serosal or epithelial surface.** LSs were sprinkled on epithelial (top row) or serosal surface (bottom row) of naïve mouse intestinal tissue in vitro. When LSs were applied on epithelial surface (top row), they could only be seen close to the epithelial surface but not within or at the opposite (serosal) surface. Likewise, when LSs were applied on serosal surface (bottom row), they were only visible near the serosal surface. No bleed-through of LS fluorescence signal was observed despite the tissue being sandwiched between the cover slip and the glass slide showing that confocal microscopy can be used to discriminate presence of LSs in intestinal tissue. |

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| **Fig S3. Penetration of LSs across intestinal epithelium in to the intestinal wall.** Mice (n=3) were fed 5 mg LSs without OVA, and 24 h later their intestinal tissues were imaged using a confocal microscope as described above. Representative confocal micrographs for mouse #2 and #3 are shown. LSs were observed in interior parts of the intestinal wall demonstrating that LSs cross the epithelial surface and enter the intestinal wall. LSs were not seen at serosal or epithelial surface. |