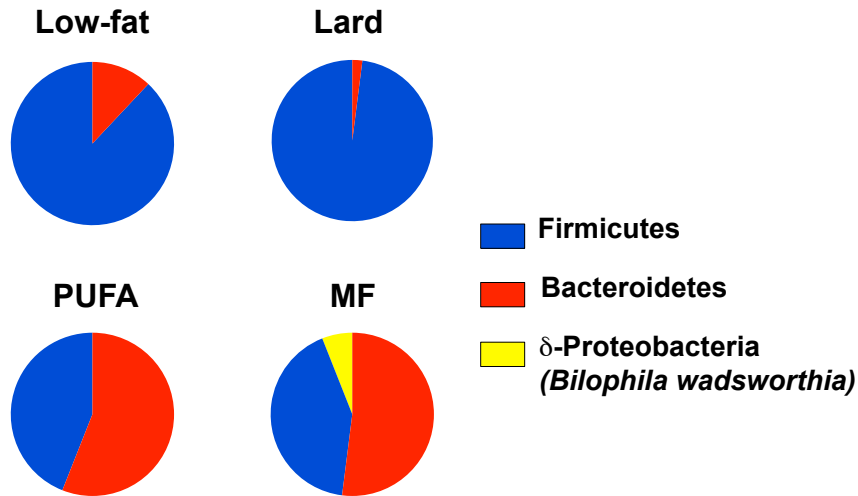
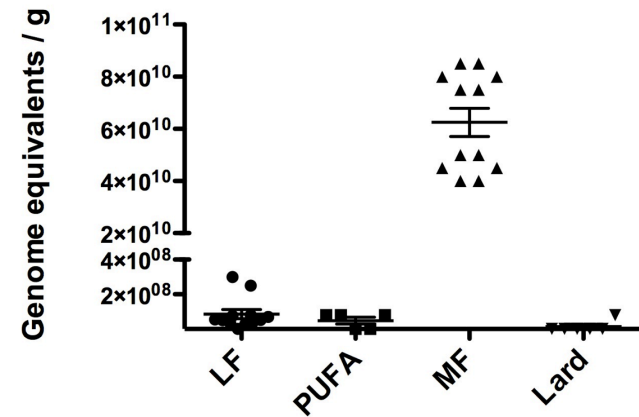


Supplementary Figure 1. High-fat diets decrease the richness and diversity of intestinal microbiota in wild type C57BL/6 mice. C57BL/6 mice were fed a low-fat (LF), saturated milk fat (MF) or polyunsaturated safflower oil (PUFA) diet for 24 days. The rarefaction curve is based on 454-based DNA sequencing of 16S rRNA gene libraries from cecal contents and depicts the number of unique operational taxonomic units (OTUs) binned per sample with each line representing sequences derived from one mouse. The slope of the line is directly related to the number of unique OTUs (i.e. increased diversity) in a sample.

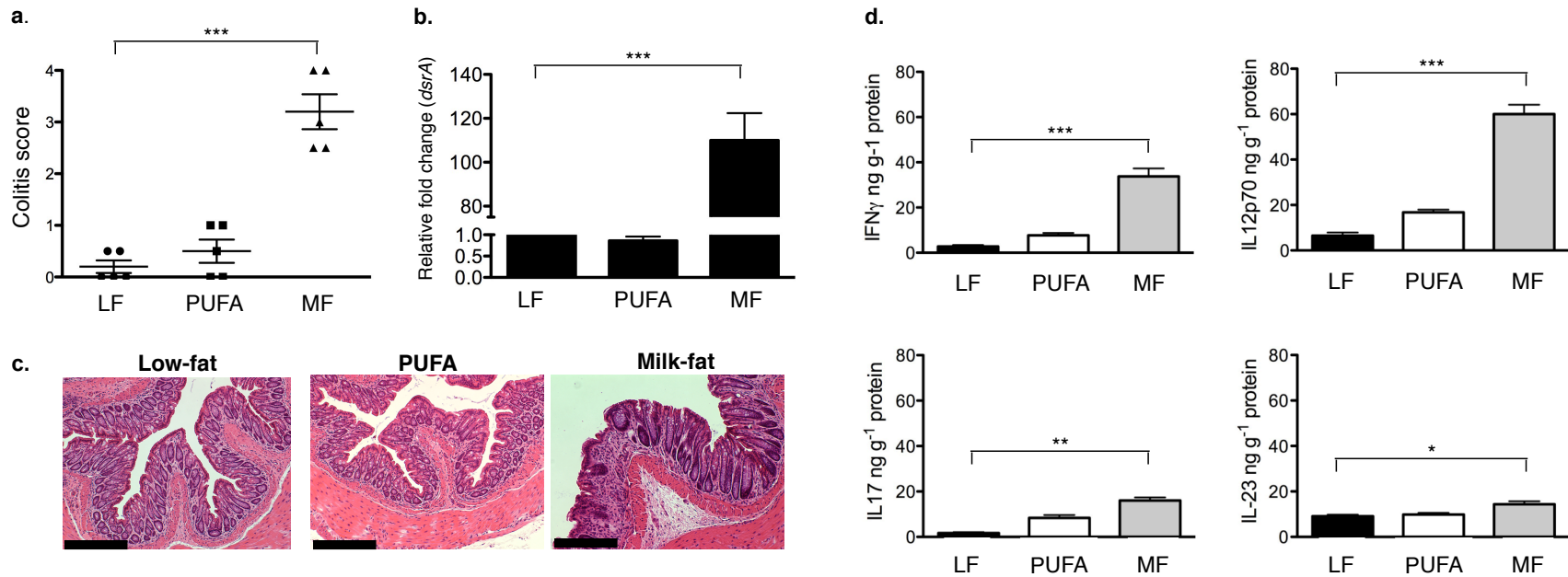
a.



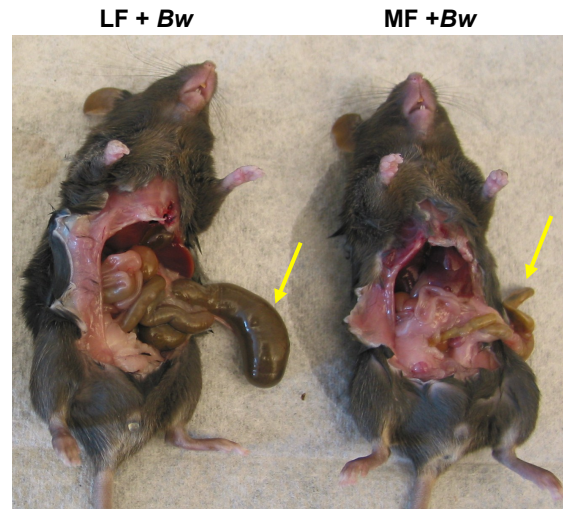
b.



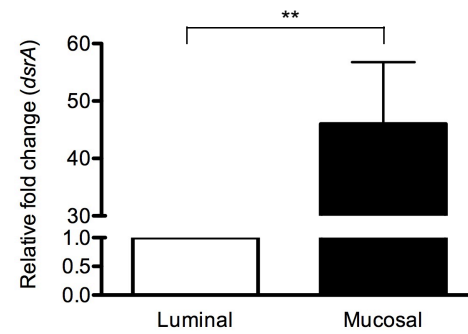
Supplementary Figure 2. Lard-based saturated fat exerts differential effects on phyla and sulfite-reducing bacteria compared to milk fat-based saturated fat. a, C57BL/6 mice (n=12) were placed on either a low-fat (LF), saturated lard-based fat, saturated milkfat-based (MF), or polyunsaturated safflower oil-based (PUFA) diet for 24 days. Total fat content of the three high-fat diets was equal at 37% kcal but the bloom of *B. wadsworthia* was only observed in the MF diet, b, and was confirmed by qPCR. Attempts to determine which fatty acid component of MF and Lard might account for the differences in phyla distribution were unsuccessful because of technical challenges in solubilizing stearic acid- the major saturated fatty acid component of MF.



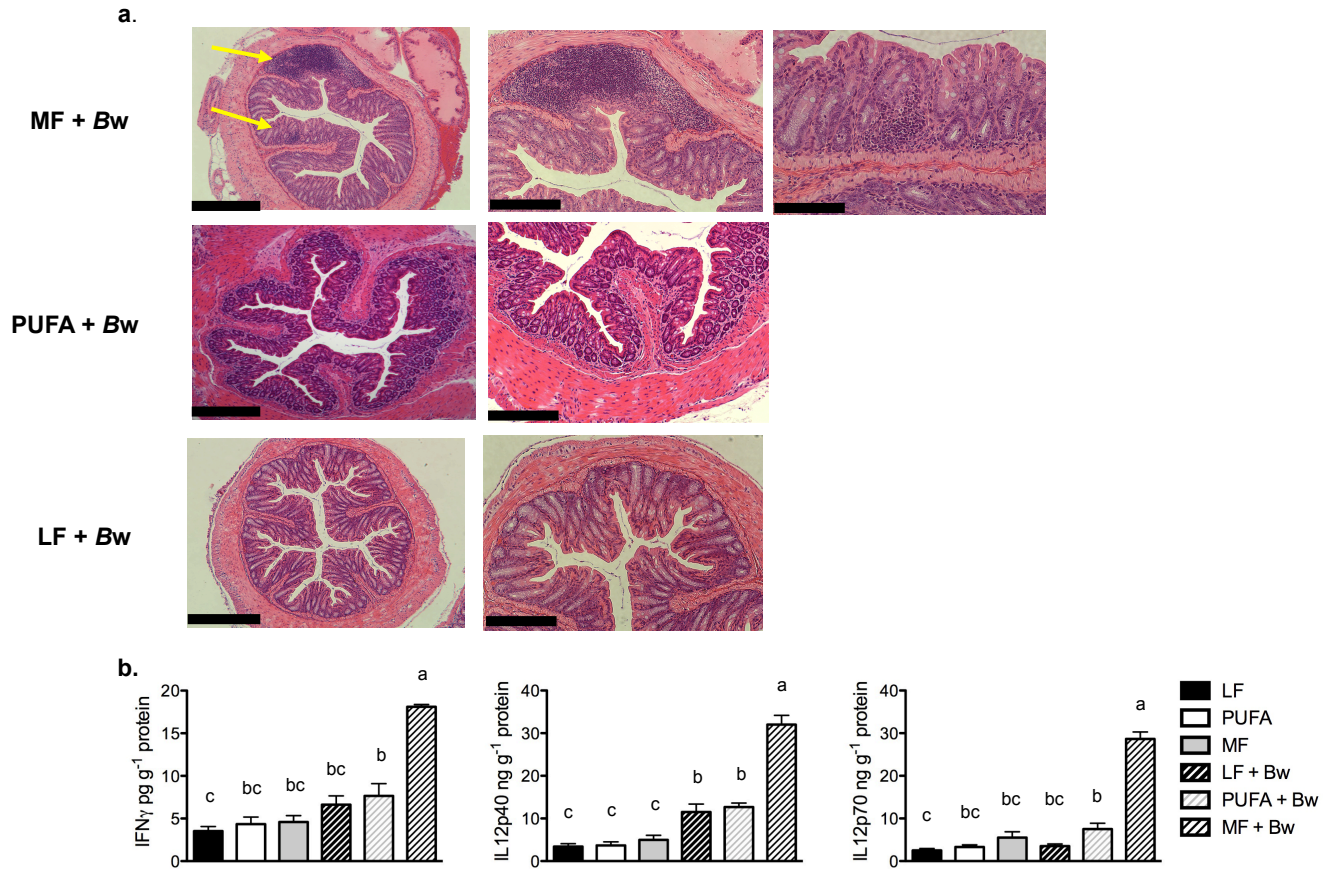
Supplementary Figure 3. Milk fat (MF) increases incidence of colitis and in acute DSS treatment and is associated with an increase in sulfite-reducing bacteria and T_H1 cytokines. **a.** Blinded histological colitis scores are shown individually and represented as means \pm S.E.M. **b.** Relative abundance of SRBs as measured by qPCR of *dsrA* and normalized to LF. Presented as means \pm S.E.M. **c.** H&E staining of distal colon. Scale bars, 400-300 μ m. **d.** Distal colonic mucosal cytokines determined by ELISA. *** P< 0.0001, **P<.001, *P<.05 determined by one-way ANOVA and Tukey post-hoc.



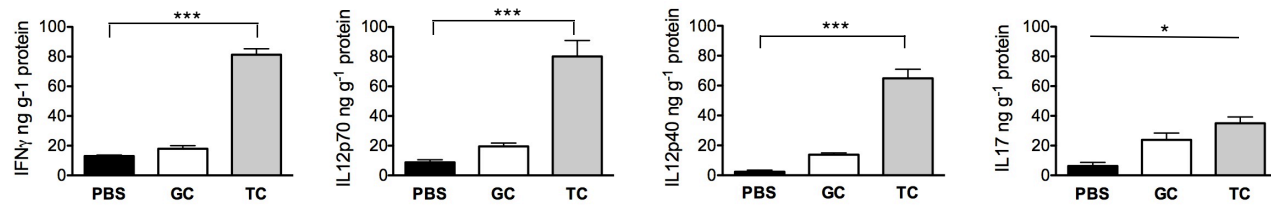
Supplementary Figure 4. *Bilophila wadsworthia* can only be established in gnotobiotic mice in the presence of MF. Representative mice from LF (left) and MF (right) + monoassociation. Note the shrunken cecum in the MF mouse, a phenomena observed with *Bw* colonization.



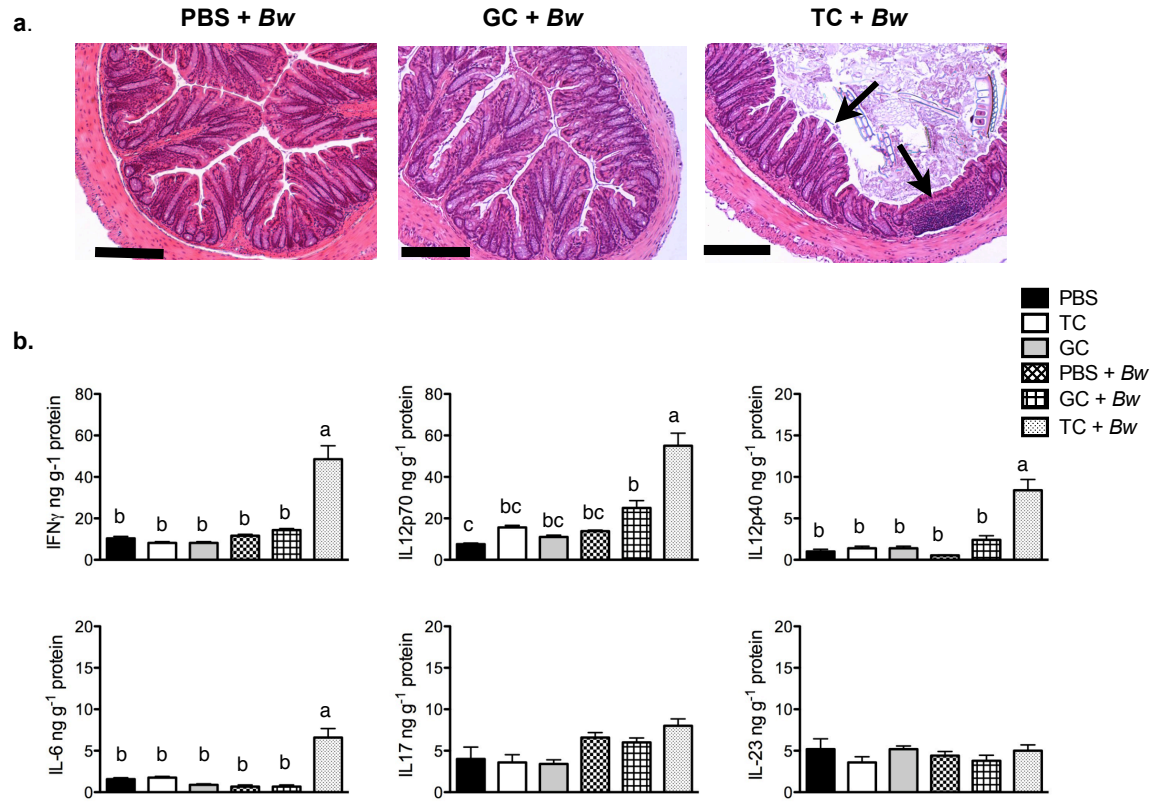
Supplementary Figure 5. *B. wadsworthia* preferentially colonized the mucosa of germ-free IL10^{-/-} monoassociated mice fed MF. GF IL10^{-/-} were monoassociated with *Bw* and fed MF for 24 days. Quantitative PCR for *dsrA* revealed greater colonization of the distal colonic mucosa compared to distal colonic luminal contents. *dsrA* values were normalized to total 16s rRNA. ** P< 0.001 determined by student's t-test.



Supplementary Figure 6. *B. wadsworthia* (*Bw*) growth in germ-free $IL10^{-/-}$ mice fed low-fat (LF), polyunsaturated fat (PUFA), or milk fat (MF) diets. a, Germ-free $IL10^{-/-}$ were fed LF, PUFA, or MF diets for 7 days, then monoassociated with *Bw*. *Bw* survived only the presence of MF and this growth induced distal colonic inflammation noted by arrows pointing to a lymphoid aggregate, which is not typically seen in GF mice until colonized with a pathogen, and immune cell infiltration. These effects were not observed in mice consuming LF or PUFA diets. Scale bars, 400 μ m. b, Distal colonic mucosal cytokines determined by ELISA. $P < .05$ determined by one-way ANOVA and Tukey post-hoc.



Supplementary Figure 7. *B. wadsworthia* (*Bw*) growth in IL10^{-/-} mice supplemented with taurocholic acid induces intestinal inflammation. SPF IL10^{-/-} were monoassociated with *Bw* and then gavaged daily with either PBS, glycocholic acid (GC), or taurocholic acid (TC) for 21 days. *Bw* survived only the presence of TC. Distal colonic mucosal cytokines determined by ELISA. *** P<0.0001, *P<.05 determined by one-way ANOVA and Tukey post-hoc.



Supplementary Figure 8. Germ-free IL10 $^{-/-}$ mice monoassociated with *Bw* and gavaged with either PBS, glycocholic acid (GC), or taurocholic acid (TC). a, Distal colon H&E staining shows increased inflammation in monoassociated mice gavaged with TC as noted by arrows pointing to crypt hyperplasia and presence of a lymphoid aggregate at the base of an area of mucosal ulceration. These effects were not observed in the presence of TC gavage alone in the absence of *Bw* (data not shown). Scale bars, 400 μ m. b, Distal colonic mucosal cytokines determined by ELISA. P<.05 determined by one-way ANOVA and Tukey post-hoc.