Supplementary Material

related to:

Chloroflexi dominate the deep-sea golf ball sponges Craniella zetlandica and Craniella infrequens throughout different life stages

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**Supplementary Material S1** Overview of denoising stats, showing the total read counts of raw reads and at each of the five filtering steps, the fractions of the total input read counts at each filtering step, and the read counts per samples at each filtering step.
**Supplementary Table S1** Stats overview TukeyHSD Posthoc tests on Shannon indices following ANOVA type III tests.

| Group 1       | Group 2               | Difference | LCL  | UCL  | p-value |
|---------------|-----------------------|------------|------|------|---------|
| *C. infrequens* | *C. zetlandica*       | 0.06       | -0.4 | 0.51 | 0.9997  |
| *C. infrequens* adult | *C. infrequens* embryo | -0.18      | -0.64 | 0.28 | 0.874   |
| *C. infrequens* adult | *C. infrequens* recruit | 0.05       | -0.31 | 0.41 | 0.9994  |
| *C. infrequens* embryo | *C. infrequens* recruit | 0.23       | -0.22 | 0.68 | 0.6724  |
| *C. zetlandica* adult | *C. zetlandica* embryo | -0.71      | -1.55 | 0.12 | 0.1325  |
| *C. zetlandica* recruit | *C. zetlandica* embryo | -0.67      | -1.45 | 0.12 | 0.1391  |
| *C. zetlandica* recruit | *C. zetlandica* adult | 0.05       | -0.4  | 0.49 | 0.9999  |
Supplementary Material S2 Different alpha diversity indices (Pielou’s evenness, Faith’s Phylogenetic Diversity, and number of observed ASVs across both sponge species and all developmental stages.
**Supplementary Table S2** Stats overview of PERMANOVAs based on weighted UniFrac distances.

| Group 1       | Group 2       | Sample size | Permutations | pseudo-F | p-value |
|---------------|---------------|-------------|--------------|----------|---------|
| *C. infrequens* | *C. zetlandica* | 39          | 999          | 12.26    | 0.001   |
| *C. infrequens* | seawater      | 39          | 999          | 226.74   | 0.001   |
| *C. zetlandica* | seawater      | 36          | 999          | 135.22   | 0.001   |
Supplementary Material S3 Contrasting aquarium samples against in situ samples. A) Linear Discriminative Analysis showing the significantly most enriched microbial phylum in C. zetlandica recruits from the aquarium system and in all other sponge individuals in comparison. B) Average prokaryotic community composition of aquarium water and in situ seawater. Order of microbial phyla is the same as in Figure 5. Circle sizes indicate relative abundances, consider scale at the top right. C) Linear Discriminative Analysis showing all significantly enriched microbial phyla in aquarium water vs in situ seawater samples.
Supplementary Material S4 Relative abundances of the 16 *Craniella* core Chloroflexi ASVs (purple colored bubbles), 46 *Craniella* zetlandica-specific Chloroflexi ASVs (yellow colored bubbles), 73 *Craniella* infrequens-specific Chloroflexi ASVs (red colored bubbles), and 36 other Chloroflexi ASVs (brown colored bubbled) for both sponge species and all developmental stages. The respective scale of the colored bubbles, which depict relative abundances, is shown below the plot.
**Supplementary Material S5** Micrographs of isolated hybridisation signals for all specific FISH probes. Subplots A-D) show embryonic tissue sample, subplots E-H) represent adult tissue samples. I-L) depict negative control (NON338). A,E,I) *Anaerolinae* (red signal), B,F,J) *Caldilinae* (green signal), C,G,K) *SAR202* (orange signal), D,H,L) DAPI counter stain (blue signal). Scale bars = 2 µm.
**Supplementary Material S6** Micrographs of an adult *C. infrequens* individual. **A)** Tissue section through the mesohyl stained with Richardson solution. bac= bacteria, scale bar = 10 µm. **B)** FISH of *Chloroflexi* within the mesohyl. Here, the merged channels of SAR202 signals (orange) and the DAPI counter stain (blue) are shown. Scale bar = 5 µm. Micrographs of isolated hybridisation signals for all specific probes (*Anaerolinae, Caldilineae* and *SAR202*) are included in Supplementary Material S1E-H.
Supplementary Video 1: Video showing release of embryos (em) from a *Craniella zetlandica* specimen upon sampling by remotely operated vehicle in 2018 at 225 m depth in Stjernsund, Northern Norway. The footage can be accessed at: doi.pangaea.de/10.1594/PANGAEA.918218.
Supplementary Material S7  *C. zetlandica* recruits (maximal 3-4 mm in size) settled within an aquarium system next to an adult *C. zetlandica* individual (approximately 10 cm in size).