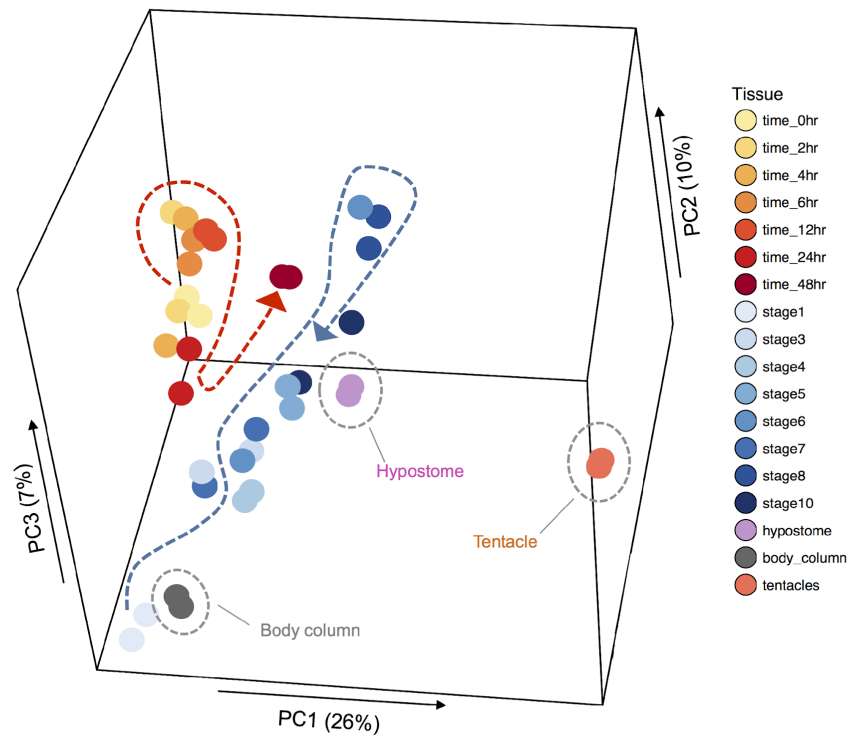
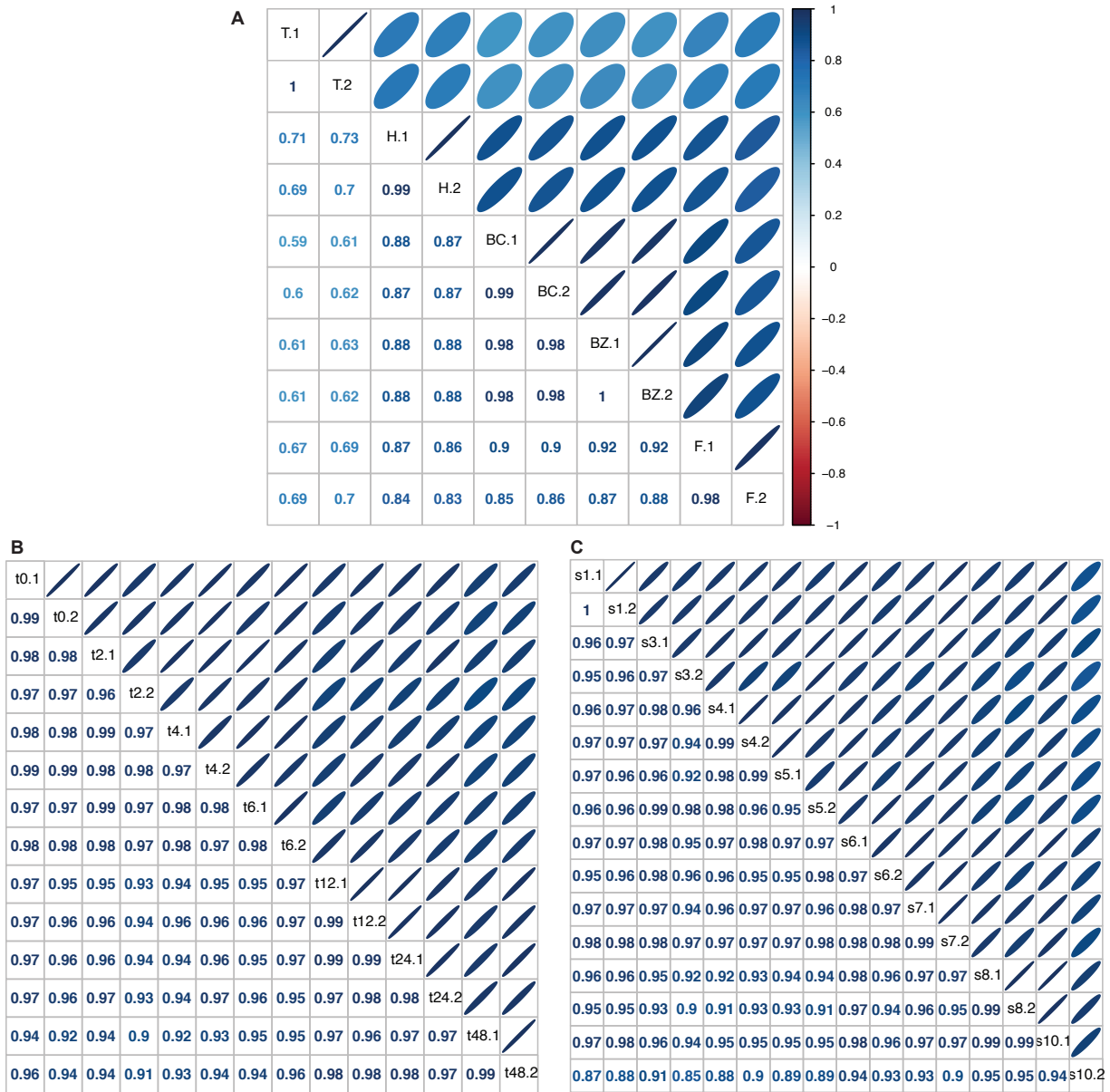


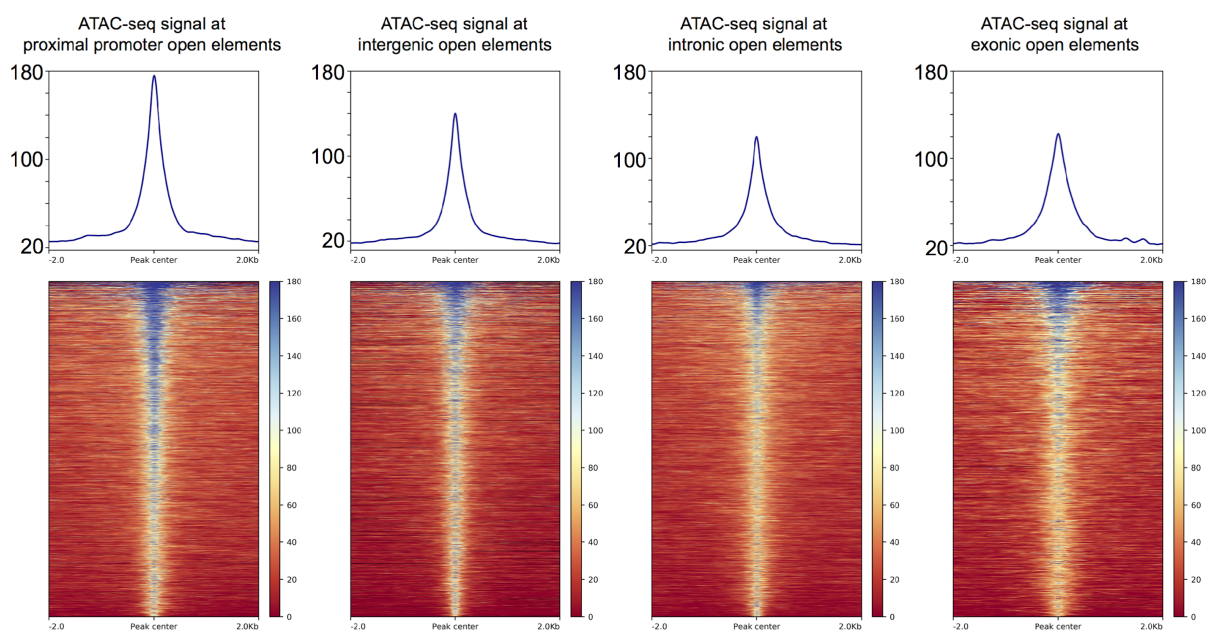
**Figure S1. Gene expression of hypostome specific genes.** (A) PCA plot showing the distinct expression profiles of hypostome, tentacles, body column, budding zone, and foot gene expression. (B) Functional enrichment analysis of genes upregulated in the hypostome using BLAST2GO and an FDR>0.05. Circle size represents number of genes and color represents similar functions. (C) Volcano plot comparing hypostome versus other tissues, colors represent significance (light grey) and functions (similar to those in Figure 2B). (D) Heatmap showing changes in gene expression of key developmental genes from panel C upregulated in the hypostome throughout stages of budding (stage1-10) and time points in regeneration (0hr-48hr).



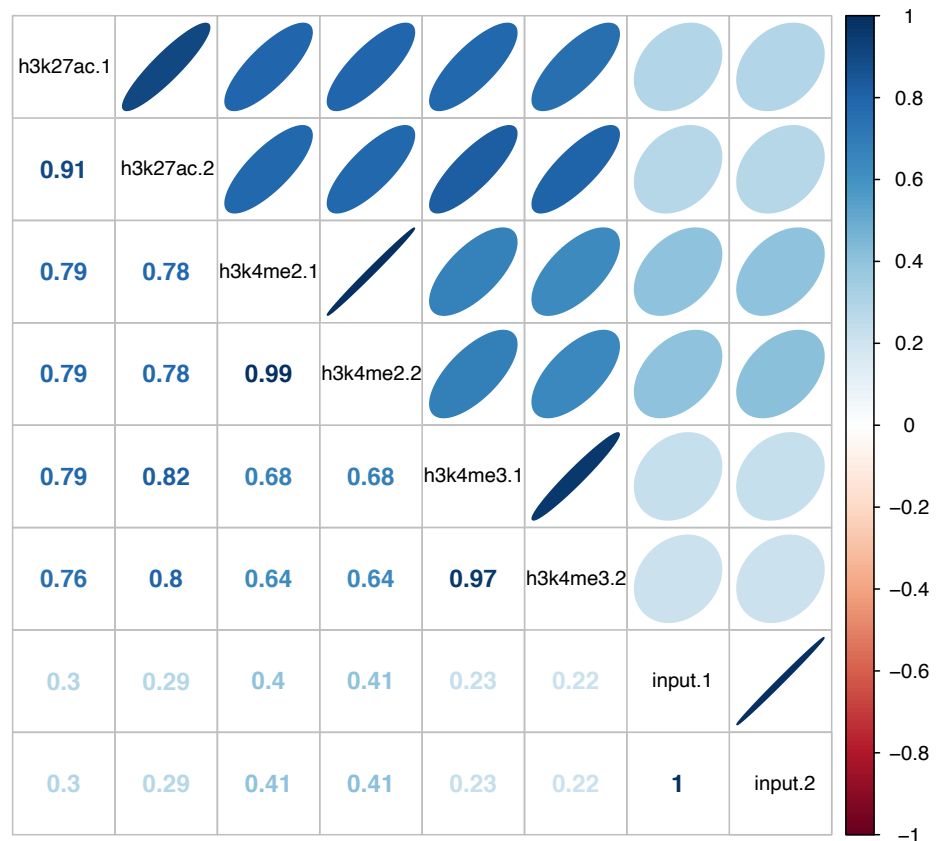
**Figure S2.** Principal component analysis (PCA) plot of head regeneration and budding time-courses as well hypostome, tentacles, and body column in *Hydra*.



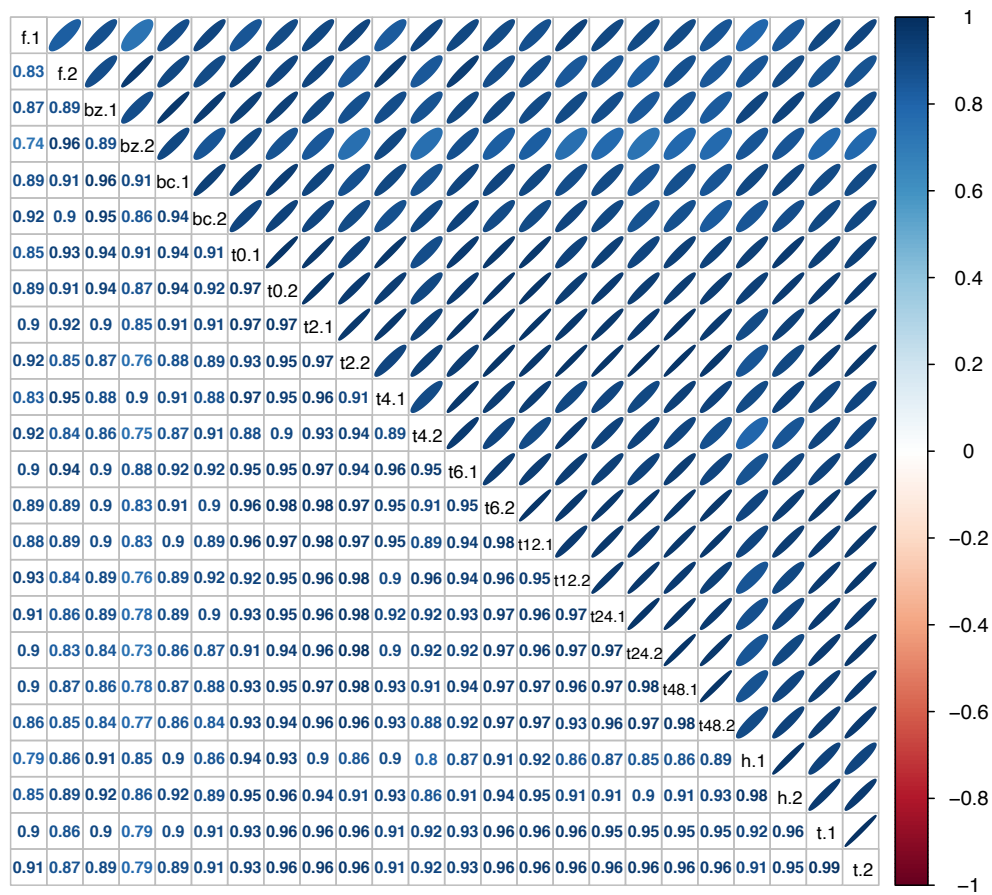
**Figure S3. RNA-seq correlation plots.** (A) Hydra body RNA-seq correlation. T is tentacles, H hypostome, BC body column, BZ budding zone, F foot. (B) RNA-seq from regeneration time course 0, 2, 4, 6, 12, 24, and 48 hours with replicates 1 and 2. (C) RNA-seq from budding stages 1, 3, 4, 5, 6, 7, 8, and 10. Color intensity and shape are proportional to the correlation coefficients which are displayed at the lower triangular; positive correlations are displayed in blue and negative in red.



**Figure S4:** ATAC-seq signal enrichment at each type of open-chromatin element. All graphs and heatmaps are to the same scale.



**Figure S5. ChIP-seq correlation plot.** 2 replicates for h3k27ac, h3k4me2, h3k4me3 and input for *Hydra* whole body. Color intensity and shape are proportional to the correlation coefficients which are displayed at the lower triangular; positive correlations are displayed in blue and negative in red.



**Figure S6. ATAC-seq correlation plot.** Color intensity and shape are proportional to the correlation coefficients which are displayed at the lower triangular; positive correlations are displayed in blue and negative in red. f is foot, bz budding zone, bc body column t followed by a number is the hour of regeneration, h hypostome and t tentacle, .1 is replicate 1 and .2 is replicate 2.