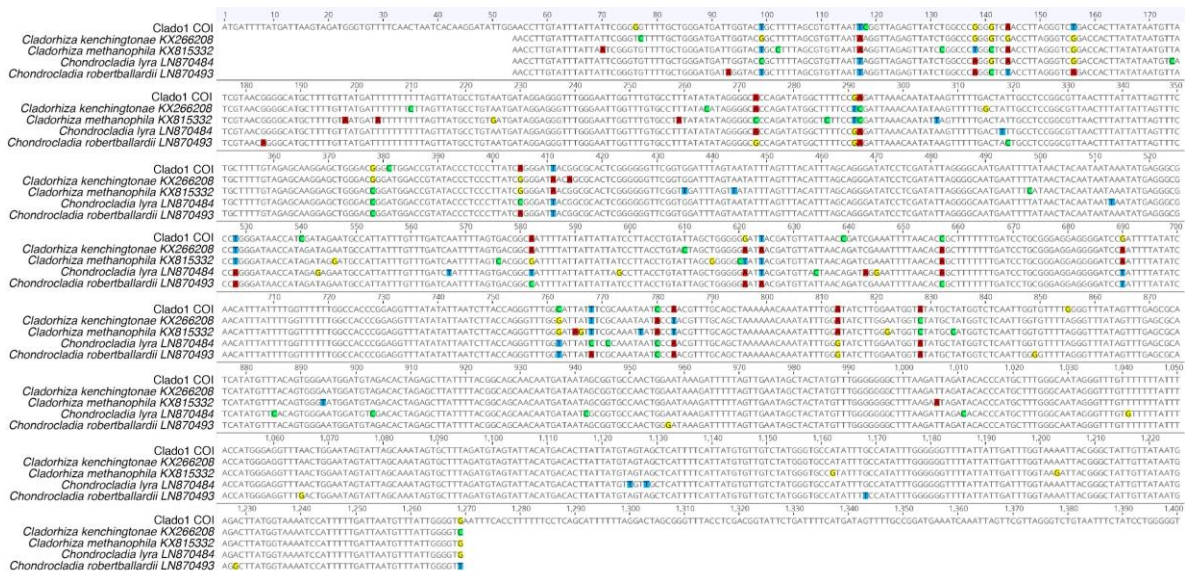
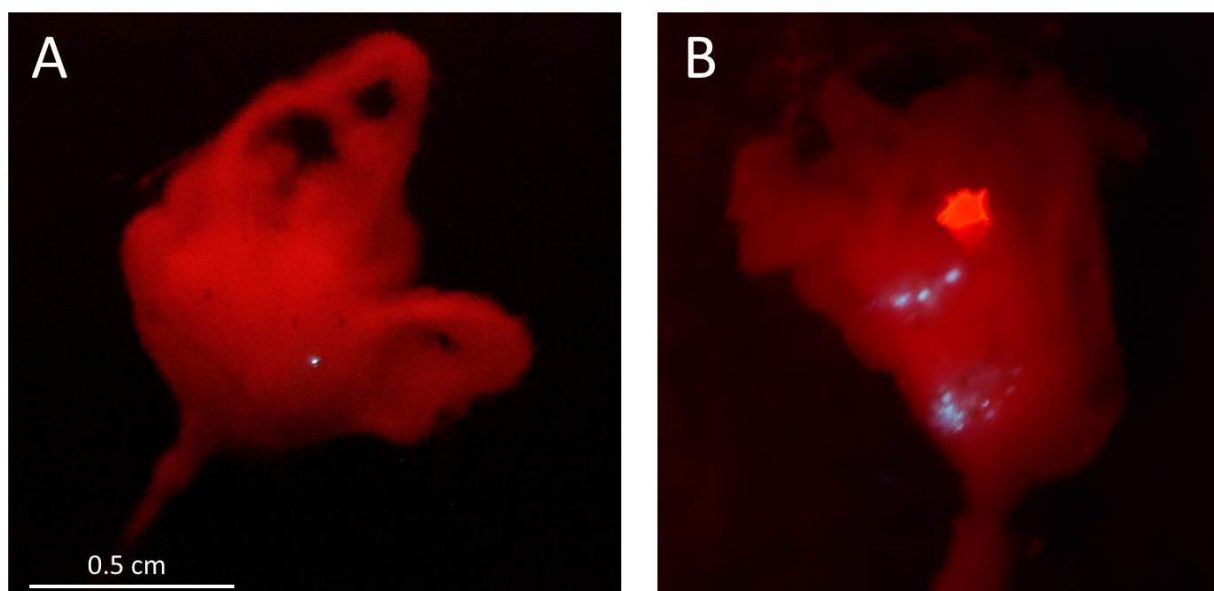


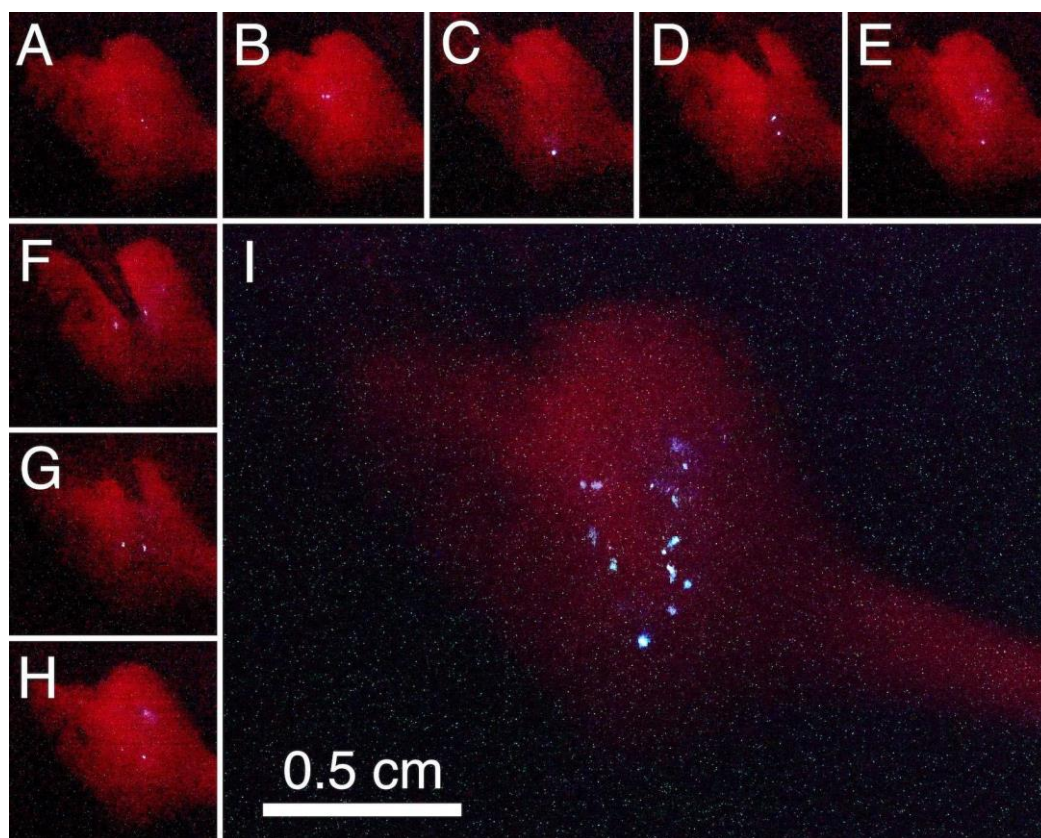
**Figure S1. IGV screenshot of the mitochondrial contig containing the COI sequence.** The contig resulting from using *Negombata magnifica* COX1 seed sequences as MITObim input, merging the resulting contigs, polishing using pilon, then mapping reads to the resulting sequence. There is no evidence of any insertions or deletions in the COX1 sequence and no immediate drop-offs in mapping continuity along the contig, indicating a correctly-assembled COX1 locus.



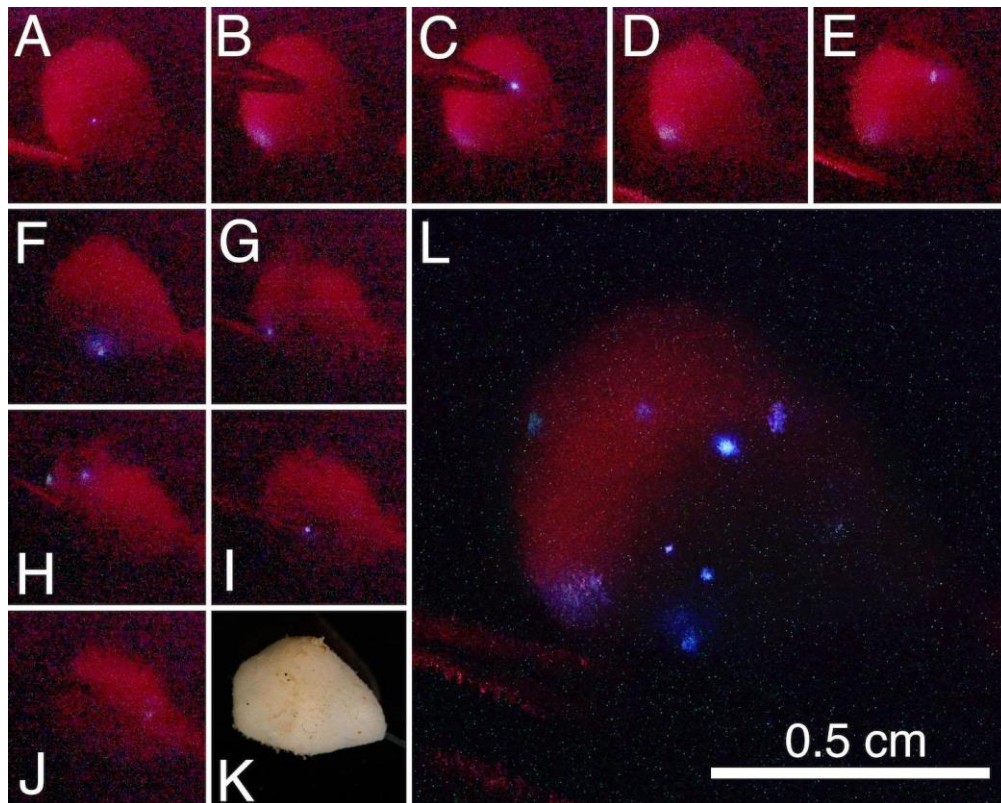
**Figure S2. Nucleotide alignment of Clado1 COI and from four closely related sponges.** The COI sequence of Clado1 is very close to the COI sequence found in both *Cladorhiza* and in *Chondrocladia*. It shares diverging sites with both genera, as well as some mutations unique to this sequence.



**Figure S3. Bioluminescence emission under red light, in the lab.** Bioluminescence events from mechanically stimulating Clado1 (A), and Clado2 (B).

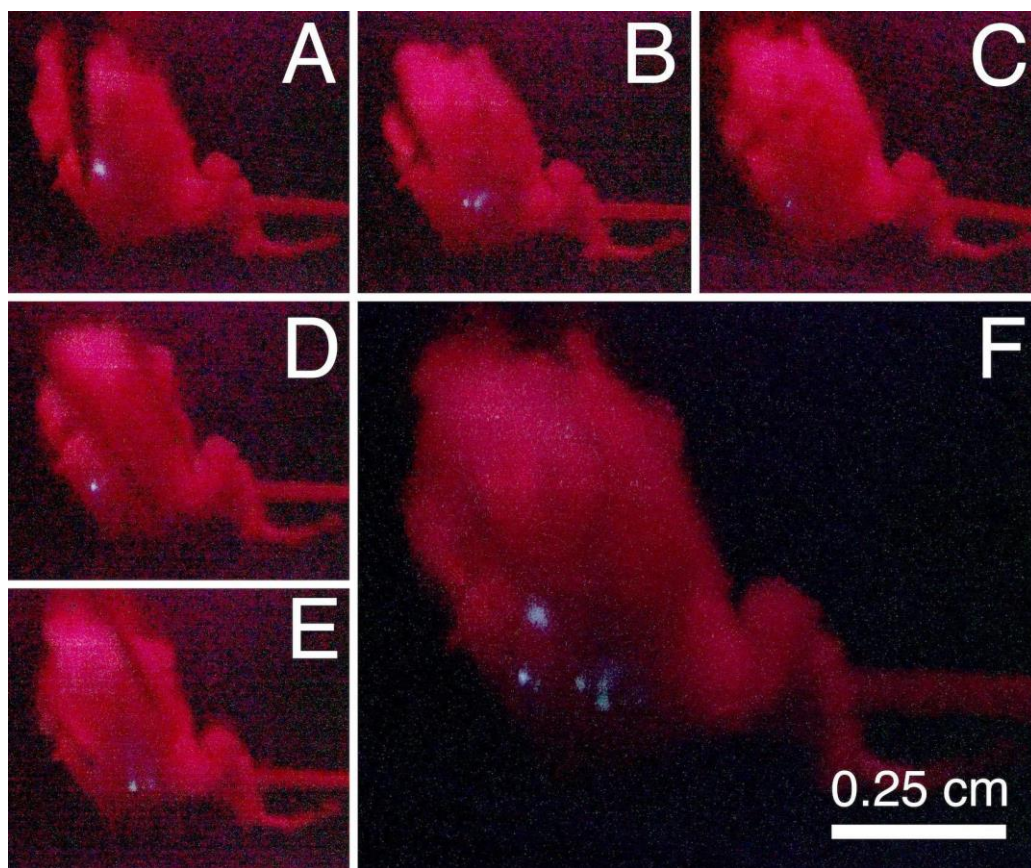


**Figure S4. Composite bioluminescence from Clado3.** Individual video frames (A-H) of discrete luminescence events from mechanically stimulating Clado3. (I) is a composite of the individual frames.



**Figure S5. Composite bioluminescence from Clado4.** Individual video frames (A-J) of discrete luminescence events from mechanically stimulating Clado4. (K) is a white-light image. (L) is a composite of the individual frames.





**Figure S6. Composite bioluminescence from Clado5.** Individual video frames (A-E) of discrete luminescence events from mechanically stimulating Clado5. (F) is a composite of the individual frames.

