

**Supplemental Table 1.** Table of all volume, length and number measurements carried out in this analysis.

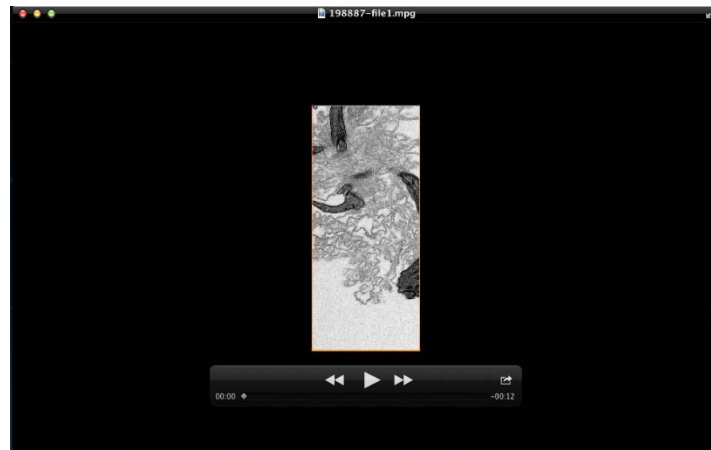
Stage of the cell cycle	Cell body volume ( $\mu\text{m}^3$ )	Standard deviation for cell body volume	Mitochondrion volume ( $\mu\text{m}^3$ )	Standard deviation for mitochondrion volume	Nucleus volume ( $\mu\text{m}^3$ )	Standard deviation for nucleus volume	Kineto-plast volume ( $\mu\text{m}^3$ )	Standard deviation for kineto-plast volume	Number of cells analysed
1	30.9	3.4	1.4	0.49	2.9	0.14	0.05	0.008	5
2	44.5	6.1	2.0	0.35	3.6	0.35	0.09	0.019	7
3	49.2	4.5	2.3	0.43	4.7	0.80	0.13	0.038	6
4	50.5	6.6	2.2	0.22	5.8	0.35	0.12	0.011	5
5	60.9	4.4	3.0	0.39	6.3	0.30	0.11	0.024	4
6	58.7	10.4	3.2	0.80	5.6	0.47	0.11	0.032	5
7	57.7	6.4	2.3	0.64	5.7	0.15	0.1	0.011	6
8	29.1	3.1	1.1	0.16	2.8	0.20	0.05	0.009	5

Stage of the cell cycle	Average number of glycosomes	Standard deviation for glycosome number	Average number of acidocalcisomes	Standard deviation for acidocalcisome number	Average number of Golgi bodies	Standard deviation for Golgi number	Number of cells analysed
1	62	7	40	9	1.3	0.5	10
2	75	14	40	9	2.3	0.5	6
3	78	17	40	12	2.9	0.6	10
4	86	14	49	11	3.2	0.8	7
5	103	15	52	9	3.3	0.5	4
6	108	11	56	17	3.4	0.8	7
7	124	17	71	17	4	1.4	5
8	67	19	33	10	2.3	0.5	7

**Supplemental Table 2.** Table of nucleus length and width and flagella length.

Stage of the cell cycle	Length of nucleus (µm)	Standard deviation for length	Width of nucleus (µm)	Standard deviation for width	Number of cells analysed
1	2.8	0.26	1.5	0.19	6
2	3.1	0.29	1.7	0.23	7
3	3.6	0.64	1.7	0.32	10
4	4.5	0.82	1.7	0.27	6
5	2.9	0.34	2.0	0.36	6
6	3.1	0.80	1.9	0.32	10
7	2.8	0.33	1.7	0.31	14
8	3.0	0.37	1.7	0.23	10

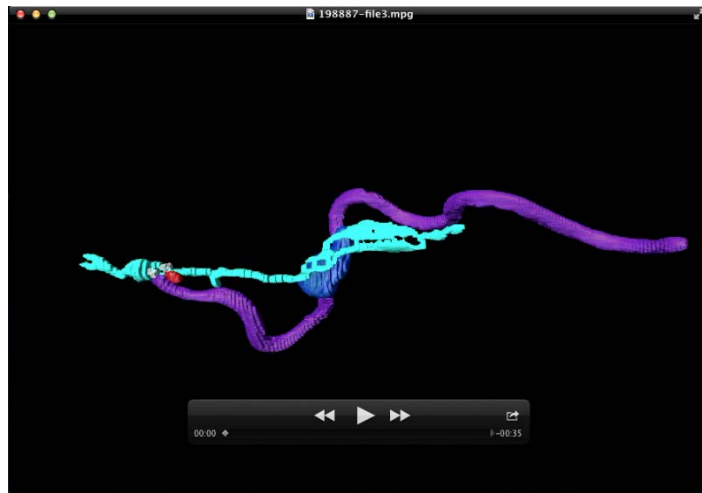
Stage of the cell cycle	Length of flagellum (µm)	Standard deviation in length for old flagellum	Length of new flagellum (µm)	Standard deviation in length for new flagellum	New flagellum length as a percentage	Number of flagella counted (old and new)
1	28.0	0.78	0	0	0	3
2	29.9	3.20	1.2	3.31	3.8	6
3	30.3	1.41	12.9	14.05	42.3	6
4	27.4	3.87	22.0	18.08	81.8	8
5	28.8	0.67	27.4	13.76	95.3	6
6	23.7	3.82	27.2	16.18	116.6	8
7	26.7	2.86	27.7	10.09	104.6	10
8	27.3	1.88	26.1	3.33	102.7	8



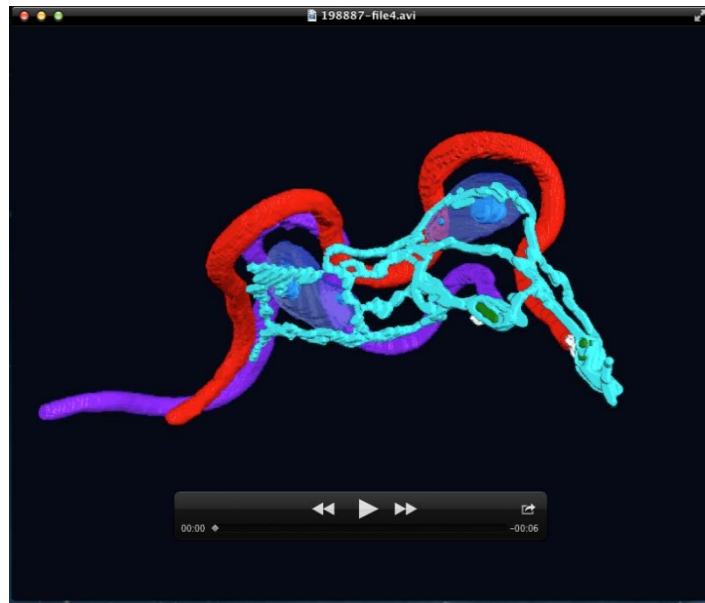
**Movie 1.** Extracted volume containing 63 slices 100nm thick slices through a G1 bloodstream form cell with segmented organelles. See text for colour scheme.



**Movie 2.** Extract volume containing 103 slices 100nm thick slices through a stage 6 cell.



**Movie 3.** Movie 3 illustrates mitochondrion division and highlights an area of a flattened areas and small fenestrations.



**Movie 4.** Mitotic cell with a branched mitochondrion located along the ventral surface of the cell.