Morphological events during resting cyst formation (encystment) in the ciliated protozoan *Colpoda cucullus*

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SUMMARY

Morphological events during encystment of *Colpoda cucullus* were studied. Some mitochondria were fragmented within 1 hr after onset of encystment induction. Thereafter, they were surrounded by membranes to form autophagosomes. In 1–2 hr, a mucus-like material was synthesized in the vacuoles (mucocyst) in the cytoplasm and the mucus masses were expelled to an extracellular space. Thereby, the cell was enveloped in a thin mucus layer. In 2–3 hr, the cells were rounded up; then surrounded by the outermost cyst wall layer (ectocyst), which is possibly derived from pellicle membranes. Chromatin granules were extruded from the macronucleus, and subsequently digested in autophagosomes. Ectocyst formation was followed by the formation of a second layer (endocyst) by the excretion of toluidine blue-stained substance (TBS) between the ectocyst and plasma membrane. The endocyst layers were formed periodically for several days. Finally, the cells were surrounded by a thin layer of mucus envelope, an ectocyst layer, and several layers of endocysts. The mitochondria activity was stopped at 7–15 hr after the onset of encystment induction. In the final step of cyst maturation (7 days), the mitochondria were surrounded by electron-lucent materials, all ciliary and kinetosomal structures disappeared, and electron-lucent granules were accumulated in the respective central regions of cells.