Parasitic adaptation of the dicyemid mesozoan *Dicyema japonicum*: Peculiar behavior of distinct chromosomal DNA elements during and after development

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The dicyemid mesozoans are obligate parasites that inhabit the cephalopod renal appendage. They have a simple body, consisting of approximately 30 cells: one long cylindrical axial cell contains intracellular stem cells, called axoblasts, from which embryos are derived, and is surrounded by some 30 peripheral somatic cells. Cells divide at most eight times during their life span, and never divide after differentiation. During early development, numerous unique DNA sequences are first amplified and then eliminated in the form of extrachromosomal circular DNAs, leading to genome reduction. Here we show that different types of sequences, such as single copy genes or repetitive sequences, have different fates. Beta-tubulin represents single copy genes that are initially amplified, presumably via endoreduplication, but subsequently decrease in copy number through development. This suggests that the whole genome is initially amplified and then the amplified DNAs are simply diluted in successive cell divisions, with little DNA replication. In contrast, tandemly-repeated sequences are likely to be selectively endoreplicated in the terminally-differentiated peripheral cell nucleus, concomitant with the increase of cell size, to maintain a general correlation between nuclear content and cell size. This is supported by the incorporation of BrdU. This peculiar behavior of distinct chromosomal DNA elements in dicyemids might have resulted from a unique adaptation to parasitism.