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Synthesis of macromolecules in early mouse embryos cultured *in vitro*: RNA, DNA, and a polysaccharide component ☆

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Abstract

The products of incorporation of uridine-5-^{3}H in embryos from the 8-cell stage to the hatched blastocyst (day 5) were analyzed by sedimentation in sucrose gradients. Ribosomal RNA is a major product of RNA synthesis during this period. Heterodisperse RNA, including a giant-size labile RNA, and 4 S RNA are also synthesized. Pulse labeling and actinomycin chase experiments have led to the identification of a rapidly labeled 39 S RNA species as a precursor of 28 S and 18 S rRNA. Low concentrations of dactinomycin inhibit rRNA synthesis selectively and to an extent proportionate to dose.

Uniformly labeled thymidine-^{14}C is incorporated into DNA, RNA, and polysaccharide. These components have been separated and analyzed in CsCl and ethidium bromide-CsCl density gradients. The DNA synthesized is nuclear and labeled to a very high specific activity. The evidence suggests that no extensive replication of mitochondrial DNA takes place during cleavage. A major portion of uniformly labeled thymidine-^{14}C is incorporated into a polysaccharide component during the blastocyst stage (day 4–5). Some properties of this polysaccharide are described.

Abbreviations

tRNA, transfer RNA; rRNA, ribosomal RNA; r-pre-RNA, ribosomal precursor RNA; dRNA, RNA with DNA-like base composition; mRNA, messenger RNA; HnRNA, high-molecular-weight heterodisperse nuclear RNA

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