Meeting: 998, Houston, Texas, SS 22A, Special Session on Mathematical Problems in the Analysis of Synchronous States in Networks

998-92-423 **Jose Diaz** (jdiaz@fis.unam.mx), Centro de Ciencias Fisicas, UNAM, Apdo.Postal 48-3, 62251 Cuernavaca, Morelos, Mexico, and **Gustavo Martinez-Mekler*** (mekler@fis.unam.mx), Centro de Ciencias Fisicas, UNAM, Apdo. Postal 48-3, 62251 Cuernavaca, Morelos, Mexico.

Synchronization of Biochemical Cell Dynamics in Embryogenesis. Preliminary report.

The mesoderm is the set of embryonic cells with the information to build the heart, kidneys, blood and other related tissues. For the Xenopus *laevis* toad the differentiation of these cells known as mesodermal induction is initiated by the protein Fibroblast Growth Factor, which activates a specific gene, Xbra, through an intracellular signaling pathway involving calcium. Here we model the embryo as a sphere and look at the behavior of a ring of cells coupled by calcium interchange. We first consider a single cell dynamics and show that biochemical oscillations of neighboring cells synchronize. For the spatio-temporal evolution of the ring of cells we consider a reaction diffusion type dynamics consisting of a set of coupled nonlinear differential equations, some with spatial inhomogeneities, and one of which has a Laplacian term defined on discrete space (cells). Two calcium wave patterns emerge depending on the distribution of the inhomogeneities. Our results reproduce some of the experimental observations and link the calcium waves to the genetic expression leading to the mesodermal induction. (Received March 02, 2004)