Team identifies molecular 'finger' that pushes the domino of life

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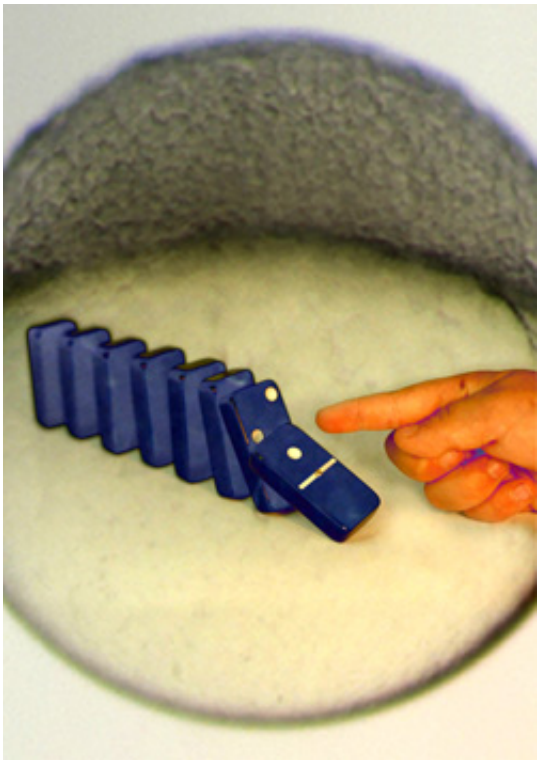

The basics of conception are familiar to any high school freshman biology student, yet scientists have yet to find the initial molecular mechanisms that set off the cascade of events that form a developing embryo.

Yale University geneticists report online Sept. 22 in the journal *Nature* that they have identified one such trigger of life—"the finger that pushes that first domino that makes all the other ones fall and initiate the making of an embryo," according to Antonio Giraldez, associate professor of genetics and senior author of the paper.

Scientists have known for a century that mothers provide the genetic instruction manual that drives early embryogenesis. This set of temporary maternal instructions help teach the embryo how to read its genome. However, the instructions that lead the mother to cede control of development to the incipient embryo remain undiscovered.

Giraldez and colleagues working with zebrafish measured which of those instructions are read with the highest frequency between the time of fertilization and the transfer of developmental control to the embryo—about three hours in zebrafish and 24 hours in humans.

They found that three factors—Nanog, Pou5f1 (or Oct4) and SoxB1—had the highest level of activity and were indeed needed to push the domino of life into motion. To their surprise these factors were the same ones that reprogram adult human cells into an embryonic-like state, a discovery that won Japanese scientist Shinya Yamanaka a share of the Nobel Prize in 2012.

"The same factors that are the fountain of youth of adult cells now provide an entry point to understanding the first domino to fall in the creation of life," Giraldez said.

More information: Nanog, Pou5f1 and SoxB1 activate zygotic gene expression during the maternal-to-zygotic transition, DOI: 10.1038/nature12632

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