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Nearly a century ago, biologists found that if they separated an invertebrate animal embryo into two parts at an early stage of its life, it would survive and develop as two normal embryos. This led them to believe that the (5) cells in the early embryo are undetermined in the sense that each cell has the potential to develop in a variety of different ways. Later biologists found that the situation was not so simple. It matters in which plane the embryo is cut. If it is cut in a plane different from the one used (10) by the early investigators, it will not form two whole embryos. A debate arose over what exactly was happening. Which embryo cells are determined, just when do they become irreversibly committed to their fates, and what (15) are the “ morphogenetic determinants ” that tell a cell what to become? But the debate could not be resolved because no one was able to ask the crucial questions in a form in which they could be pursued productively. Recent discoveries in molecular biology, however, have (20) opened up prospects for a resolution of the debate. Now investigators think they know at least some of the molecules that act as morphogenetic determinants in early development. They have been able to show that, in a sense, cell determination begins even before an egg (25) is fertilized. Studying sea urchins, biologist Paul Gross found that an unfertilized egg contains substances that function as morphogenetic determinants. They are located in the

cytoplasm of the egg cell. i.e., in that part of the(30) cell ' s protoplasm that lies outside of the nucleus. In the unfertilized egg, the substances are inactive and are not distributed homogeneously. When the egg is fertilized, the substances become active and, presumably, govern the behavior of the genes they interact with. Since the(35) substances are unevenly distributed in the egg, when the fertilized egg divides, the resulting cells are different from the start and so can be qualitatively different in their own gene activity. The substances that Gross studied are maternal(40) messenger RNA ' s --products of certain of the maternal genes. He and other biologists studying a wide variety of organisms have found that these particular RNA ' s direct, in large part, the synthesis of histones, a class of proteins that bind to DNA. Once synthesized, the(45) histones move into the cell nucleus, where sections of DNA wrap around them to form a structure that resembles beads, or knots, on a string. The beads are DNA segments wrapped around the histones. the string is the intervening DNA. And it is the structure of these beaded(50) DNA strings that guides the fate of the cells in which they are located.

25. It can be inferred from the passage that the morphogenetic determinants present in the early embryo are(A) located in the nucleus of the embryo cells(B) evenly distributed unless the embryo is not developing normally(C) inactive until the embryo cells become irreversibly committed to their final function(D) identical to those that were already present in the unfertilized egg ( E ) (E) present in larger quantities than is necessary for the development of a single individual

26. The main topic of the passage is(A) the early

development of embryos of lower marine organisms(B) the main contribution of modern embryology to molecular biology(C) the role of molecular biology in disproving older theories of embryonic development(D) cell determination as an issue in the study of embryonic development ( D ) (E) scientific dogma as a factor in the recent debate over the value of molecular biology 27. According to the passage, when biologists believed that the cells in the early embryo were undetermined, they made which of the following mistakes?(A) They did not attempt to replicate the original experiment of separating an embryo into two parts.(B) They did not realize that there was a connection between the issue of cell determination and the outcome of the separation experiment.(C) They assumed that the results of experiments on embryos did not depend on the particular animal species used for such experiments.(D) They assumed that it was crucial to perform the separation experiment at an early stage in the embryo ' s life. ( E ) (E) They assumed that different ways of separating an embryo into two parts would be equivalent as far as the fate of the two parts was concerned. 28. It can be inferred from the passage that the initial production of histones after an egg is fertilized takes place(A) in the cytoplasm(B) in the maternal genes(C) throughout the protoplasm(D) in the beaded portions of the DNA strings ( A ) (E) in certain sections of the cell nucleus 29. It can be inferred from the passage that which of the following is dependent on the fertilization of an egg?(A) Copying of maternal genes to produce maternal messenger RNA ' s(B) Sythesis of proteins called histones(C)

Division of a cell into its nucleus and the cytoplasm(D)

Determination of the egg cell ' s potential for division ( B ) (E)

Generation of all of a cell ' s morphogenetic determinants 30.

According to the passage, the morphogenetic determinants present

in the unfertilized egg cell are which of the following?(A) Proteins

bound to the nucleus(B) Histones(C) Maternal messenger RNA

' s(D) Cytoplasm ( C ) (E) Nonbeaded intervening DNA 100Test

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