biological sciences

Human conception in test tube

Laboratory fertilization of human eggs and sperm has been achieved several times. Yet none of the test-tube embryos was implanted in a woman's womb and carried successfully to term (SN: 2/24/73, p. 124).

Now another human egg has been fertilized in the laboratory, this time by Carl Wood and John Leetong of Queen Victoria Hospital in Melbourne, Australia. They tried to see the fertilized egg to birth, since the egg, and the sperm that fertilized it, were provided by a childless couple. When the fertilized egg was implanted in the woman's womb, though, it survived only nine days.

Sooner or later a human test-tube embryo will probably make it to birth. The American Medical Association fears that embryo implants may lead to serious abnormalities or to sacrifice of the child being grown (SN: 5/6/72, p. 295). Paul Ramsey, worries about the ethics of embryo manipulation (SN: 10/30/71, p. 294). Still other people are alarmed about the eugenics potential of test-tube conception. James Bonner, a biologist at the California Institute of Technology, predicts that test-tube fertilization of select human eggs and sperm will eventually be used to weed genetic flaws out of the human race.

How mother's smoking affects her child

It is well known that women who smoke during pregnancy tend to give birth to premature or low-weight babies. The National Children's Bureau in Britain has now found that babies of women who smoke cigarettes during pregnancy have a 30 percent higher incidence of death just after birth than those babies born to nonsmoking mothers. The bureau also found that surviving children of cigarette-smoking mothers were three-tenths of an inch shorter, trailed three months in reading skills and were less well-adjusted in school than children of nonsmokers.

Making a DNA necklace

A biochemist at University College, London, has developed a model that accounts for most of what is known about the replication of DNA, the genetic material of cells. An intriguing feature of the model, described by Panayiotis Ioannou in the Aug. 29 NATURE NEW BIOLOGY, is the production of a sequence of bubble shapes.

Each chromosome in a cell contains two parallel strands of DNA. According to Ioannou's model, the parallel strands have numerous replication sites, which are adjacent to each other along the strands. DNA strands between adjacent sites are replicated as a unit.

When a unit is to be replicated, the sites marking its boundaries are nicked. RNA primers, known to assist in DNA replication, are synthesized and fit themselves into the nicks, forming a replication complex between the section of DNA strands to be duplicated.

DNA complementary to the unit of parental strands is synthesized. As the two new DNA chains grow past each other in the replication complex, the complex may collapse because it is not capable of accommodating two new strands as well as two parental strands. The RNA primers move away; the nicks on the parental strands are repaired.

After repair, the strands no longer lie horizontal to each other, but bulge out from each other, in a "microbubble" configuration. The configuration looks like a bead in a necklace. As DNA replication moves down the DNA strands, from one replication site to another, more and more microbubbles (beads) are added to the DNA necklace.

space sciences

Nimbus 5: Corrects maps of poles . . .

World atlases delineating the outer boundaries of the polar ice caps are far from accurate, says Per Gloersen of the Goddard Space Flight Center. Gloersen has been studying pictures—the first photos of the total area of the polar caps—received from the scanning microwave radiometer aboard the Nimbus 5 experimental meteorological satellite.

"The pack lines at both poles are not smooth around the ice edges as shown in the world atlases, but consist of many indentations," Gloersen says. Any one in ships in the areas would find many coves or channels not shown on maps.

The satellite can "see" through the clouds usually obscuring the poles and photograph daily changes. A series of the photographs shows large-scale changes in the polar regions over short periods of time. In particular, the boundaries between the multiyear ice pack centered around the North Pole and the large areas of the first-year ice are found to vary significantly within one freezing period.

. . . maps moisture in atmosphere and soil

Using Nimbus 5 data, Al Chang and Thomas Wilheit of the Goddard Space Flight Center have prepared a color-coded map of the world. The map primarily indicates the moisture content in the atmosphere; it also shows snow and vegetation cover and moisture content of the land, but not as clearly.

The map is prepared through use of a computer and an image-making machine that change brightness temperatures into color variations. Rainfall or heavy moisture content in the atmosphere is depicted as light blue; dryer atmosphere, as dark blue. Extremely dry areas, such as the dry arctic air (with only about 5 percent humidity), are light green. High-pressure systems with fair skies, sunny weather and low moisture also come out as light green.

Measurements over land are more difficult to interpret. The hot, dry Bolivian highlands are depicted as lavender; deserts, as red. Regions of high soil moisture, such as river valleys, come out yellow. Snow cover appears olive green.

. . . measures rainfall over the oceans

Oceans cover 75 percent of the earth's surface. But until now, meteorologists have had no way to monitor adequately the rainfall over the oceans on a global scale. Now Nimbus 5 is doing just that.

The satellite is taking measurements of the water vapor that evaporates from the ocean, changes to water again and falls back as rain. Knowing the extent and rate of this evaporation can give scientists a good idea of how much energy (heat) is being released into the atmosphere. Knowledge of the rainfall rate and the energy release will aid in weather forecasting.

. . . extends polar navigation season

The Navy's Fleet Weather Facility (FWF) in Suitland, Md., is using the Nimbus 5 imagery daily on an operational basis. The satellite can observe the ice in the Arctic and Antarctic through the clouds or through the long periods of polar darkness. As a result, shipping operations in the areas will probably be extended several months.

Not only has the satellite imagery extended the navigation season, "it has shown us more ice than we ever knew existed," says William Dehn, head of the sea ice department at FWF. The data are also being used by other nations, including Japan, the U.S.S.R., Brazil, Argentina, and France.