BIOMEDICINE

Julie Ann Miller reports from New York at the seminar on Advances in Hormone Research

Bacteria copy hormone-controlled gene

It's another first in the recombinant DNA field: bacterial production of a hormone-regulatable gene. Bert W. O'Malley of Baylor College of Medicine in Houston announced, "We can extract, purify and clone [reproduce] in bacteria one of the genes responsible for [chicken] egg production under control of steroid hormones."

Other work in O'Malley's laboratory showed that the gene coding for the ovalbumin protein is divided into three parts by "insertion sequences," such as those identified recently in several mammalian genes (SN: 10/1/77, p. 214). The gene that O'Malley and his colleagues Savio Woo and Achilles Dugaiczyk transferred into *Escherichia coli* contains those insertions plus stretches on either side of the coding region. It is one of only a few native genes reproduced with recombinant DNA. The rat insulin gene (SN: 5/28/77, p. 340), for example, was copied from messenger RNA, and therefore did not have any regulatory or insertion sequences.

Escherichia coli, containing the ovalbumin gene spliced to DNA of the bacterial virus lambda, in several days churned out 10^{15} copies of the gene for each one originally inserted. O'Malley believes such large quantities of the gene will allow scientists to learn how hormones interact with DNA to control production of life-sustaining substances. O'Malley reports that he and colleagues were already able to turn on genes for egg-white proteins by adding the hormone progesterone, complexed with its receptor, to chromosomes from chick oviduct target cells.

Large quantities of genes open possibilities for developing gene therapy. O'Malley predicts that within a decade defects in single genes could be repaired by putting a synthetic gene into human cells.

Rings, rods, shots may rival the pill

"We are stuck on preventing release of the egg," says Sheldon J. Segal of The Population Council's Center for Biomedical Research. He went on to outline progress in contraception through hormonal prevention of ovulation.

A soft, rubber-like ring that releases a hormone is one device well-advanced in testing. Placed in the vagina, behind the cervix, it gradually releases d-norgestrel, which is absorbed through the vagina and enters the blood. Levels of hormone lower (but more constant) than those used in oral contraceptives are sufficient to inhibit ovulation. Daniel R. Mishell Jr. of the University of Southern California School of Medicine has recently reported that some worrisome metabolic effects of oral contraceptives are not observed when the ring is used. In a clinical study, triglycerides and several liver proteins were found to be unaffected.

Segal reported completion of a large double-blind study of another method for continual release of a contraceptive hormone. Silastic rods surgically implanted under the skin have remained effective for four years so far. The rods, containing levonorgestrel, give a pregnancy rate as low as that of contraceptive pills. Although the study revealed menstrual disturbances, nearly 80 percent of the participants continued with the implant. That is a higher continuation-rate than for IUD or pill.

Segal also described recent work on a vaccine against the pregnancy hormone, human chorionic gonadotropin (SN: 12/18/76, p. 398). A study of 19 women confirmed earlier Indian observations that the vaccine caused production of antibodies to HCG, but did not interfere with the menstrual cycle. Biochemical studies of liver and kidney function and a variety of other systems revealed no abnormalities. The basic principle of the vaccine approach has been confirmed, Segal says, but many tasks lie ahead before effectiveness and safety of this approach are proved.

SPACE SCIENCES

Jonathan Eberhart reports from Houston at the annual Lunar and Planetary Science Conference

Two shocks for Shergotty

The Shergotty meteorite, which fell in India in 1865, has interested scientists for several reasons, including the fact that it is mineralogically so close to certain earthly rocks (diabases) as to suggest the possibility of a terrestrial-type parent body. Now Shergotty has become still more interesting with a research group's conclusion that it shows "by far the youngest rubidium-strontium age of any meteorite" — 165 million years.

The date is not necessarily that of the meteorite itself, but of some event that involved enough heat to "reset" the object's Rb-Sr "clock," changing the isotope ratios by which the date is measured. One possibility is that the reported age is merely that of the most recent time when the rock cooled to a solid state from having been completely melted. However, says Laurence E. Nyquist of the NASA Johnson Space Center in Houston, nearly all of the plagioclase in the rock has been converted to maskelynite, a mineral transformation strongly suggesting that a substantial impact (a collision with another object) did the job.

Furthermore, says Nyquist, who did the study with colleagues from the Lockheed Electronics Co. in Houston, potassium-argon dating produces an age between 400 million and 600 million years. An impact of the proper size could have established the Rb-Sr date while only incompletely resetting the K-Ar clock, but it is unlikely that crystallization by cooling from a full melt could produce the difference between the two datings.

If Nyquist is correct, this would be at least the second impact event identified in Shergotty's lifetime. The other, reported in 1968 by Dieter Heymann of JSC and colleagues, is indicated by a cosmic-ray exposure age of 2.5 million years. It has been argued, Nyquist says, that this could be the sole event, partially resetting both the Rb-Sr and K-Ar ages, but the near-total extent of mineralogical transformation seems to imply an event that could fully reset the Rb-Sr date.

Reading moonshakes

The seismographic instruments left on the moon by U.S. astronauts were shut down on Oct. 1, 1977, along with the rest of the devices in the Apollo Lunar Science Experiment Packages (ALSEP's). In eight years of operation, they picked up tremors from only one event — it happened in 1972 — large enough to help define the size of the moon's core (170 to 360 kilometers diameter, says Gary V. Latham of the University of Texas Marine Science Institute in Galveston), but other parts of the picture are more clearly drawn.

By the end of July 1977 (the date through which the data have been analyzed), the seismometers had detected 1,700 meteorite impacts, 32 shallow quakes — "the only truly tectonic moonquakes," Latham says — 2,775 deep quakes and 7,500 still-unclassified events. With all the data in hand, the data are expected to show about 1,800 meteorite impacts, 35 shallow quakes and 10,000 deep ones. The meteorite impacts, oddly enough, seem to be seasonal, since most of the large ones take place between late April and early June, when there is also about a 10 percent increase in the number of impacts per unit time.

About 80 source regions for deep moonquakes have been discovered so far, concentrated at depths of from 800 to 1,000 km. "The remarkable periodicities of these events," says Latham, "quickly led to the hypothesis that they were generated by tidal stresses, and that they occurred just above the partially molten zone because that is precisely where [tidal] stress concentrations would occur." As for the shallow, presumably tectonic events, he says, if the moon is expanding or contracting, it is doing it very slowly. The inferred interior lunar structure is "a pretty good snapshot of the evolutionary path we can expect our planet to follow."