the amphibian oocyte as "a living test tube" for studying gene expression. In experiments with purified cell parts in normal glass test tubes, expression of animal DNA is inefficient and much less accurate than in an intact cell. However when purified DNA from a variety of sources is injected into frog oocyte nuclei, it is reliably copied into messenger RNA, the intermediary between DNA and protein synthesis. Janet E. Mertz and Gurdon demonstrated such gene action for several days after cells were injected with DNA from animal and bacterial viruses, bacterial plasmids and fruit fly genes, they reported in the April PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. When the amount of SV40 DNA injected is 1,000 times the amount of frog oocyte DNA, most of the new messenger RNA produced is specific to the virus. These viral messenger molecules seem to be the same as those that predominate when the virus infects monkey cells. Therefore, the oocyte closely mimics normal selection of DNA regions and normal processing of messenger RNA. Furthermore, the SV40 and fruitfly DNA can direct production of protein in oocytes, the researchers indicate.

Oocytes may be more suitable "living test tubes" for studying gene control in plants and animals than are bacterial cells because the oocytes are more likely to respond to relevant control signals. Unlike the naked bacterial DNA, genetic material of higher organisms is assembled with proteins into a complex called chromatin. Gurdon and co-workers observe that purified SV40 DNA injected into an oocyte nucleus is also assembled into such a complex. Therefore, the foreign genes may be sufficiently disguised to direct the cell action. The exact role of the nuclear proteins may be revealed by further studies in this system. □

Malaria, herpes vaccines: Progress

In spite of eradication of smallpox and other infectious diseases throughout the world, malaria persists as an enormous problem. One of the difficulties is that the mosquitoes that carry malaria parasites have become resistant to DDT, and biological controls for such mosquitoes have not yet become effective (SN: 8/2/75, p. 73).

However, last year saw a major advance toward a human malaria vaccine. For the first time, human malaria parasites could be continuously propagated in the test tube, thus providing a ready source of vaccine material (SN: 6/5-12/76, p. 361). Now another landmark achievement brings a human malaria vaccine still closer to reality—nonhuman primates have been successfully immunized against a human malaria parasite.

Wasim A. Siddiqui of the University of Hawaii School of Medicine first maintained *Plasmodium falciparum,* a human malaria parasite, in the lab by serial passages of blood-induced infections in owl monkeys. He then cultivated the parasites in the test tube, harvested them for vaccine purposes and used five owl monkeys in a pilot experiment. Two of the monkeys served as controls, three were vaccinated with a parasite solution twice three weeks apart.

As Siddiqui hoped, the vaccine was weak enough in parasite content that it did not produce any malaria in the monkeys. He then injected all five monkeys with enough of the parasite to trigger malaria. Both control monkeys died two-weeks later. In contrast, the three vaccinated monkeys survived, with one completely malaria-free, and the two others showing only minor infection.

Although the number of monkeys used in this experiment was small, the difference between the course of infection in immunized and nonimmunized animals was impressive, considering how lethal *P. falciparum* usually is for owl monkeys. Indeed, this is the first report of a study in which 100 percent survival has been achieved in owl monkeys following a dose of the human malaria parasite *P. falciparum.* In fact, the only comparable malaria immunity ever achieved in monkeys before was against a nonhuman malaria parasite.

These results, coupled with those of last year, suggest that a human malaria vaccine may become a reality in the not-too-distant future.

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Significant progress is also being made in the development of a human herpesvirus vaccine. Herpes viruses are known to cause cold sores and genital infections in people. Evidence strongly suggests that herpes viruses also trigger human cervical cancer and some other kinds of human malignancies.

A herpes virus vaccine that is effective in primates has already been developed (SN: 6/29/74, p. 413). The problem with using such a vaccine in humans, however, is that even though it has been inactivated, it contains viral genetic material that might possibly cause infection rather than prevent it. Gary R. Pearson and Robert E. Scott of the Mayo Clinic/Foundation in Rochester, Minn., have conducted experiments to see whether a herpes vaccine might be developed using material obtained from herpes virus-infected cells, not from the viruses themselves. Not containing viral genetic material, such a vaccine would have to be safe. The question is, would it be effective as well?

Using a newly developed method for isolating plasma membrane vesicles from cells, the researchers managed to extract plasma membrane vesicles from herpes-infected cells that were virus-free yet containing virus-induced membrane antigens. The vesicles were then injected into four monkeys and, as the researchers hoped, the vesicles raised antibodies to herpes virus in the animals.

The results of this pilot experiment, the investigators conclude in the June PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, strongly suggest that a herpes vaccine prepared from herpes-infected cell vesicles would be both effective and safe in humans. □

Test detects liver damage in alcoholics

A New York doctor says he has developed the "first reliable blood test" enabling the early detection of liver disease among alcoholics. Detection at that stage renders many liver problems "fully reversible," heading off more serious ailments, such as cirrhosis of the liver, says Charles Lieber, chief of the Section and Laboratory of Liver Diseases, Nutrition and Alcoholism at the Bronx Veterans Administration Hospital.

The new technique represents a considerable improvement over previous blood tests, which were not specific enough to accurately detect liver damage due to alcohol, Lieber says. Those tests attempted to identify liver problems by measuring transaminase, an enzyme released into the serum by injured body tissues. But the detection of transaminase could indicate problems in any number of tissues, including the liver, he notes. And, he adds, the enzyme is more suited to identifying viral hepatitis than alcohol-related liver complications.

Lieber's test hinges on the activities of the mitochondria, the rod-shaped "power plants" of liver cells, where the cells' energy is produced. Mitochondria exist in every cell but, according to Lieber, play a specific, critical role when liver damage occurs. In such cases, the diseased liver releases glutamate dehydrogenase (GDH), an exclusively mitochondrial substance, into the bloodstream.

In a study of 100 alcoholics versus 100 control patients, Lieber and his colleagues recently measured GDH levels in the blood and compared them to the presence of lesions that develop in the liver. He says the team found an excellent correlation between blood levels of GDH and the degree of liver necrosis in alcoholics.

Researchers still have no sure way of predicting which alcoholic patients with early liver disease would go on to develop cirrhosis, notes Lieber, who is also professor of medicine and pathology at Mount Sinai School of Medicine in New York. But he says the new blood test for liver disease may be a step toward developing "a blood test to predict cirrhosis."

In his search for such a test, Lieber believes that his experiments with baboons have provided some clues. He found that some "alcoholic" animals had pericentral sclerosis in the liver, a condition not present in normal ba-

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