the one whose cell nucleus was transplanted.

"When a nucleus is transplanted, the egg behaves as if it has been fertilized," he explains. This phenomenon, too, is being studied by researchers interested in cell differentiation because it supports the view that cell cytoplasm plays an important role in the expression of genes or genetic material.

The nuclear genes contain all the information for the creation of a new frog, but when in a skin cell, they produce only more skin cells. When transplanted to an egg cell, they express themselves differently.

Although experiments with amphibian nuclear transplants often result either in abnormal development or no development at all, the reason, Dr. Blackler suggests, is because the host egg is faulty, perhaps immature or too aged, and not because the nucleus is defective.

Nuclear transplantation has not yet been applied to mammalian cells; they are smaller and more difficult to work with. But there appears to be no insurmountable technical barrier to such transplants. Dr. Blackler anticipates that when they come the incidence of failure and abnormality will be even lower than it is in amphibians. First applications, once the technique is perfected, are likely to be put to breeding identical prize cattle, hens that lay many eggs and the like.

The social issues raised by the prospect of genetic engineering were the prime concern of the AAAS participants in the genetics symposia. Their only firm conclusion was that these problems must be faced before genetic surgery becomes as common as a tonsillectomy. According to Dr. Skolnikoff, the public must talk about it, Congress should debate it and more committees, such as the one headed by Representative Emilio Daddario (D-Conn.) on science, research and development, should try to anticipate the effects of scientific advances.

Looking back, Harold P. Green, professor of law at George Washington University in Washington, D.C., suggests that there would be some value in slowing the pace of such revolutionary research by deliberately limiting funding for work in sensitive areas. If history repeats itself, Green and others agree, genetic technology will evolve on a laissez-faire basis; legal rules for social control of the technology will not be formulated until the social problems actually emerge.

The alternative, the imposition of legal restrictions in advance, could dull or kill a field of research that has as much potential for good as for misuse.

Dr. Sinsheimer sees in genetic technology the potential realization of man's ancient dream of self-perfection. "The new eugenics would permit in principle the conversion of all of the unfit to the highest genetic level. I know there are those who find this concept repugnant, but they do not see our present situation whole. They are not among the losers in the chromosomal lottery that so firmly channels our human destinies. Repugnance isn't the response of the four million Americans with diabetes or the 250,000 children born in the United States every year with genetic diseases or the 50 million healthy Americans whose IQ is below 90."

When genetic surgery comes, viruses are likely to be the surgeons' tools.

When a virus infects a cell it substitutes its own genetic material for the cell's, directing the manufacture of new viruses instead of new, healthy cells. It is possible, in bacteria, to attach non-viral DNA (deoxyribonucleic acid) to non-infectious or safe viruses; those viruses will carry the DNA into the cell, and new genetic instructions with it.

Conceivably, then, if a person has a genetic defect because he lacks the gene that codes for production of an essential protein or hormone, one could attach a suitable synthetic gene to a virus which would carry it into his cells. This would supply him with additional, corrective genetic information.

Already Dr. Arthur Kornberg of Stanford has created the synthetic core of a virus (SN: 12/30/67, p. 629). Shortly, scientists expect, Nobel Laureate Gobind Khorana of the University of Wisconsin in Madison (SN: 10/26/68, p. 411) will complete the first synthesis of a gene. And only last month, researchers succeeded in crystallizing transfer-RNA, ribonucleic acid—another essential carrier of genetic information, (SN: 1/4, p. 9). Crystallization will lead to determination of its structure, which will lead to synthesis.

COMBINATION ANTIBIOTICS

FDA moves against nine

Antibiotics suffer from the appellation of wonder drug. Patients have asked for, and doctors often have prescribed, antibiotics in almost every conceivable type of illness.

Recently this often indiscriminate use has come under serious questioning by some parts of the medical community, most noticeably those near the government. The first major action against antibiotics was taken earlier this year by the Food and Drug Administration against chloramphenicol (SN: 2/24/68, p. 184).

The FDA, saying the broad-spectrum antibiotic is both dangerous and far too freely prescribed, imposed label warnings on the drug and sent a "Dear Doctor" letter out to the nation's physicians warning of the danger of overuse.

The agency now plans action against nine other antibiotic-containing products, as a result of a review of the efficacy of some 3,000 drugs being carried out for the FDA by the National Academy of Sciences (SN: 2/17/68, p. 160). The review is the result of the Kefauver-Harris Drug Amendments of 1962.

These require that a drug placed on the market shall not only be safe (as previous law required) but also effective for the purposes advertised. The 3,000 drugs being checked by the NAS are those marketed since 1938 but before the amendments became effective.

Periodically throughout 1968 the FDA has announced plans to withdraw approval of drugs found ineffective by the review. With the exception of bioflavonoids, which caused a flurry in January, most of the drugs named are little used or obsolete. In fact, a spokesman for the drug industry said early in the proceedings, "When all is said and done, there are going to be some dogs taken off the market."

The spokesman may not have been thinking of the list of nine antibiotic combinations, however. These have been widely prescribed in the past decade and their makers have pushed them hard. Panalba, for instance, made by the Upjohn Co., has been the star of several full-page advertisements in recent issues of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

The efficacy review panel has labeled as ineffective for their recommended purpose the following combination products:

- Achromycin Nasal Suspension, made by Lederle Laboratories. This product contains the antibiotic tetracycline, hydrocortisone and phenylephrine and is touted for nasal decongestion and the reduction of inflammation of the nasopharynx. Presumably the antibiotic is supposed to fight secondary bacterial infections which often accompany primary viral infections of the tract.
- Mysteclin-F, made by E. R. Squibb and Sons. This contains tetracycline and amphotericin B, the latter an antibiotic effective against some fungal infections. It is promoted for simultaneous control of a broad range of bacterial and fungal infections.
- Albamycin G.U. tablets by Upjohn, containing calcium novobiocin and the sulfa drug sulfamethizole, promoted for the treatment of urinary tract infection.
- Panalba capsules, Panalba half-

strength capsules, Panalba-KM flavored granules for suspension (two forms), and Albamycin-T capsules and flavored granules, all made by Upjohn and all containing tetracycline and novobiocin. The basic claim for such combinations is that, by their multi-pronged attack, they are effective against bacteria which resist other antibiotics, or that they are effective in cases where the patient cannot tolerate other antibiotics.

The review panel said of the Achromycin Nasal Suspension that it is not "necessary or desirable to include antibiotics in preparations of this type. Indeed it seems unlikely that tetracycline will ever reach the organisms responsible for sinusitis, pharyngitis, or other syndromes in which bacteria may be important pathogens."

The panel added that it has seen no evidence that this or similar preparations "offer advantages over conventional decongestant therapy."

The Panalba group and similar combinations, the panel says, have no place in rational therapeutics. It says the claims for these drugs are backed by no properly controlled studies but only by reports from a few patients.

Of Mysteclin-F, the panel comments that it is "not aware of evidence of proved efficacy" on the part of the drug in preventing the fungal infections as claimed for it by Squibb. It adds that it considers it preferable not to use anti-fungal drugs indiscriminately as prophylaxis against what it calls uncommon illness.

The panel takes issue with the implication it says is made by Upjohn to the effect that Albamycin G.U. Tablets are the drug of choice in the treatment of urinary tract infection.

According to the FDA, its objections to unneeded antibiotics goes beyond wanting to stop the consumer wasting his money and time on useless treatment. There is also the fact that a person's private population of disease organisms can become immune to antibiotics they encounter too often, and may later erupt in an infection against which existing weapons are useless.

The manufacturers of the named products have 30 days in which to file protest or comment with the FDA. As of now the agency says, it plans to withdraw its certification of the drugs. This will mean they will have to be removed from the market until the maker can prove their effectiveness to the Government's satisfaction.

The FDA makes it plain that it is not moving against the constituents of the nine products, all of which have proven effectiveness. The targets are the combinations and the claims of effectiveness, in certain ailments, the effectiveness supposedly resulting from putting several drugs together.