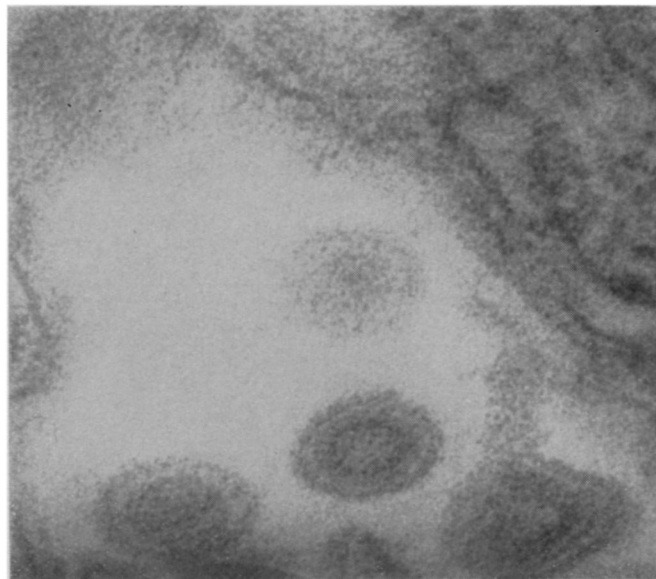


Cancer and the virus

The cause of tumors may be inherited and waiting to be released



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Maloney Sarcoma Virus rescued by leukemia virus coat.

There is little doubt among researchers that some viruses have some role in some cancers.

But there are serious blocks in the way of creating cancer vaccines. Before any theory can be woven to account for a viral origin of cancer, explanations must be found for some thorny inconsistencies.

A tentative explanation for one of the thorniest was offered last week at the Autumn meeting of the National Academy of Sciences, held at California Institute of Technology in Pasadena. Dr. Robert J. Huebner, newly appointed chief of the National Cancer Institute's viral carcinogenesis branch, reports evidence that so-far-undetectable viruses passed on by the victim's mother are able to emerge from hiding and produce a tumor.

In most instances of disease caused by microorganisms, hordes of viruses or bacteria can be found infesting the disease site. If a microorganism cannot be found in a primary site, microbiologists are most reluctant to say that it caused the disease.

In the case of human cancer no one has been able to find a virus associated with a tumor. Laboratories have grown many strains of virus which induce leukemia and other cancers when injected into mice. But even here, in many cases, it has not been possible to find any of the injected virus in the tumor it has presumably caused.

In fact, certain strains of mice develop a high incidence of leukemia and other cancers spontaneously, without exposure to leukemia virus. Not only can the virus not be seen in the malignant cells, but until now it has not been found in animals before tumor development.

Recently virologists have begun to suspect that the fault lies not with their viruses but with themselves. Complex and subtle techniques are revealing viruses locked within cells that previously would have been certified virus free. Dr. Huebner and his associates believe that these so-called occult viruses are important in the induction of naturally occurring cancer.

Dr. Huebner, working in alliance with Dr. Janet Hartley of the National Institute of Allergy and Infectious Diseases, has found that traces of a virus known to induce leukemia in mice appear in the bloodstream in advance of the spontaneous development of leukemia. Laboratory conditions make it very unlikely that the mice used in the experiment could be infected from the outside world, so Dr. Huebner concludes the animals were carrying the virus all along.

Taking cells from an apparently healthy and virus-free animal, the researchers are able to obtain viruses in a carefully chosen tissue culture, demonstrating that the animal is host to ordinarily undetectable and apparently dormant viruses. Dr. Huebner calls such viruses "switched off."

In another group of experiments Dr. Huebner has been able to retrieve viruses from tumors where no viruses were thought to be.

The tumors were induced by injection of Maloney Sarcoma Virus (MSV), though it could not be found in the cancer cells.

By mixing the cancer cells with healthy cells, then innoculating the mixture with leukemia-inducing viruses, Dr. Huebner is able to obtain a crop of viruses. These viruses induce sarcomas.

Viruses consist of a protein coat



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Dr. Huebner: switched-off viruses.

around a string of genetic material, either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA), which makes the virus what it is.

The explanation for the MSV phenomenon is that the leukemia virus acts as a rescuer for the sarcoma virus's genetic core.

This core is defective; it is unable to make its own protein coat, and therefore cannot venture out of the cell it infects in order to infect other cells. It lies dormant, undetectable. The leukemia virus enters the cell and is able to make the cell reproduce both leukemia virus cores and coats. In the process of coat making the cell fits out not only the new leukemia virus cores but also the old MSV cores. These emerge to produce more sarcomas.

Dr. Huebner ties these phenomena together as follows: Animals born prone to spontaneous cancer carry the dormant virus from the time of conception. It is present in the mother's egg. The virus remains dormant while the animal grows up and reproduces, incidentally passing on the virus. Later in the animal's life its biochemistry changes, or some genetic predisposition to being a virus host becomes effective, and the virus becomes active.

The viruses Dr. Huebner is studying are grouped together as C-type RNA viruses. These are naturally occurring viruses with a predilection for secretiveness.

"My personal opinion," Dr. Huebner says, "is that this is the only kind of virus that can explain cancer generally. I'm giving up on all other types of virus to study this one. To me it is the most interesting and exciting of all (tumor causing viruses.)" ◇

INSURRECTION

Feedback at the meetings

Cybernetics is the study of automatically controlled systems, be they electronic computers, home thermostats, or the human brain and nervous system.

Feedback is an essential part of cybernetics. An automatically controlled system is supposed to feed its results back to its controller, and this information leads the controller to perfect the working of the system.

So it is appropriate that when a revolt over the question of feedback in scientific meetings occurred, it was during a meeting of the two-year-old American Society for Cybernetics. Appropriate, but upsetting, at least to one society official, who complained, "Why pick on us? Why not some old established society that can take it?"

Feedback, in the sense of instant, continuous alteration, is not part of the program at traditional scientific meetings. For 300 years, since the first meetings of the Royal Society and the Academia della Crusca, scientific meetings have proceeded by having a series of individuals mount the podium and read papers. If there was any discussion, it came at the end of the presentation; reactions of the audience did not affect the speaker or cause him to alter his presentation in midflight.

Over the generations many scientists, even the old-fashioned ones, have expressed boredom with such proceedings. Some aver that much of what is said is so much crusca (chaff).

But the format makes it easy for papers to be published later.

The tradition was followed, perhaps automatically, by the cybernetics society when it programmed its symposium on Cybernetics and the Management of Large Systems, at the National Bureau of Standards. However, some of the society's members are not cast in the old-fashioned mold.

"I don't know who you are, sir," a voice from the back of the room interrupted a paper on cybernetic analyses of large scale computers, "and this isn't meant personally for you. But I'm tired of listening to this."

Dr. Warren Brodey of the Environmental Ecological Laboratory at Mas-

sachusetts Institute of Technology, strode to the stage, and a five-minute insurrection followed.

"Last night," said Dr. Brodey, who had been joined by his colleague, Dr. Avery Johnson, "the two of us talked to the Board of Directors. We turned that board on. Overnight something has turned them off."



Dr. Brodey: elegant communication.

The activists want to change the format of all scientific meetings, to make them exciting, "to make it happen in a microcosm," in Dr. Brodey's words.

They came up against a conservative faction that shouted back at them from the floor: "Once you have activists, you can no longer control the bastards." "When I come to listen to somebody, I want to sit and listen and then interact."

Society officials moved quickly to regain control. A group of them took the microphone and promised that if the speaker could finish, part of the discussion time would be devoted to matters of format.

Later, society officials announced a happening for the next day's lunch hour to discuss format. "All those interested in the happening please congregate at lunch," said the session chair-

man. "You are all allowed to eat during the happening so long as there is no throwing of food." Dr. Frank Fremont-Smith of the New York Academy of Sciences volunteered as "immoderator" of the happening. "He will serve," said the chairman, "as a stabilizing influence to prevent violence."

What the activists are after is a total remaking of scientific meeting format. Especially in the cybernetics society, says Dr. Brodey, where the subject is elegant communication between machines and men, one should spend some time discussing how communication can be best achieved at the meeting. And one should use cybernetic techniques in the meeting format, he feels.

Participants in symposia should be immediately confronted with the problems they discuss. At a discussion of urban problems, for example, a model of the city could be present instead of having experts come and describe the city. The room could be filled with smog and there could be an occasional bus to drown out the speakers.

To this an objector responds: "Imagine trying to hold a scientific meeting on a damn freeway."

Six or seven sessions going on at once could be presented on closed circuit television, and a viewer could turn his attention to what interests him at the moment. The viewer could interject comments or questions by a TV feedback. Such proceedings could be recorded on tape, edited and sent around to interested parties. To the tapes could be added comments and communication by the receivers and a continuing interchange could develop.

Other scientific societies report no revolutions, but several are moving to alter format for various reasons.

Much discontent centers on contributed papers—those which are offered by members rather than being invited by the meeting organizers. These are usually short. Ten minutes is the tradition in the American Physical Society.

One suggestion to the physical society has been that ten-minute papers be replaced by sessions in which people state informally what they are going to do instead of reporting what they have already accomplished, and a free discussion is held of future trends.

Both the American Chemical Society and the American Geophysical Union have experimented with cutting contributed papers to very short statements of what has been done and spending most of the session on questions and answers.

The Institute of Electrical and Electronics Engineers continues to hold meetings in which formal paper procedure is adhered to, but in fast breaking fields like solid state physics they find small symposia with little formal program most effective.