Flow Labs.

Gilden: We are reasonably sure.

a virus from a human cancer tumor (SN: 7/10/71, p. 21). They did not claim they had cultured a human virus, but their evidence pointed that way. Now Drs. Raymond V. Gilden of Flow Laboratories in Rockville, Md., and Drs. Huebner, Wade P. Parks and George J. Todaro of the National Cancer Institute report in NATURE that the Houston agent is not a human virus but probably a mouse virus, presumably a contaminant.

Drs. Priori and Dmochowski sent samples of their cell line to the NCI team for verification, but that is not what they got. The particular viruses in question can be identified for either mouse, hamster, rat or cat because in each case they carry species-specific determinants that can be immunologically tested for. "We are reasonably sure that the virus is of mouse origin," says Dr. Gilden.

Drs. Priori and Dmochowski were attending a leukemia symposium in Padua, Italy, this week, but one of their colleagues, Dr. James M. Bowen, assistant professor of virology at the University of Texas, said they were aware of the new data but they interpret it quite differently. They have a steadily increasing volume of data that supports their original conclusions, he says, some of which has been accepted for publication and should appear in NATURE NEW BIOLOGY within the next few weeks. Dr. Bowen also claimed that under the conditions the culture was established and handled "the possibility of accidental contamination is extremely remote."

When asked about this, Dr. Huebner said: "Any claim that this is a human virus requires more than a human cell line with a virus in it. They are entitled to their opinion but they cannot disprove our findings. We are using positive proof for a mouse virus and they are using negative proof to say that it is not a mouse virus. We are interpreting things differently." □

SENSITIVE TO CHANGES

Sea life's chemical senses

For fish and other underwater life, a sensitivity to chemicals plays the same role as the sense of smell does for land animals. Natural chemicals, either released from other organisms or present in the water, play vital roles in attraction to food, attraction of male to female, recognition of predators by prey and recognition of home-stream territory by migrating fish (SN: 8/7/71, p. 98).

Dr. David B. Boylan and two other colleagues from the Woods Hole Oceanographic Institution, Drs. John H. Todd and Jelle Atema, have been studying the subtle ways this delicate fish-communication system can be disrupted by pollutants. They reported on their work this week at the national meeting of the American Chemical Society in Washington.

One study examined the effects of kerosene pollution on the behavior of lobsters. Asbestos strips treated with 20 microliters of kerosene were introduced into 180-gallon tanks containing three lobsters each. The researchers had listed 65 behavioral components to describe the reaction of the lobsters to the kerosene.

They found that the kerosene disrupted the normal behavior of the lobsters, causing increases in stress reactions, grooming activity and aggression toward other lobsters. Most of the behavior changes seemed to be due to the water-soluble component of kerosene that consists predominantly of aromatic hydrocarbons (SN: 3/14/70, p. 263). The lobsters also did something that surprised the scientists—they ate the kerosene-soaked asbestos strips. "Kerosene seems a pretty unlikely food," observes Dr. Boylan, but the action indicates that animals living in the vicinity of oil pollution may become contaminated with the oil and become unfit as a source of food.

The experiments demonstrate that chemical communication interference takes place at extremely low dilutions, Dr. Boylan concludes. "Such subtle, nonlethal effects could easily lead to disruption of a natural community."

In another approach to the problem, the researchers are studying the actual mechanisms of chemical stimulation. Like salmon, alewives migrate periodically to the stream where they were born. They apparently recognize their home stream by its unique chemical composition. The scientists placed alewives at the base of a Y-maze. Water from the fish's home stream was introduced into one arm of the Y and water from a different, adjacent stream into the other. The fish were able to distinguish their home streams, even when the chemical differences between the two streams were slight.

Since fish can return to the same stream year after year, Dr. Boylan says, the chemical composition of a stream must be fairly constant, and any change in the identifying chemical markers would confuse returning fish and effectively reduce the number of spawning sites for the fish. He and his associates hope that further study of the chemical nature of the stream markers will give a better idea of what type of pollution would be most likely to interfere with the chemical fingerprint of a stream. □

CITES CUTS BY OMB

NSF aide resigns over budget

The Federal budget process is a yearlong struggle. While many agencies have yet to receive their 1972 fiscal year appropriations from Congress, the Office of Management and Budget (OMB) is setting guidelines for the 1973 budget and battles rage on both fronts.

Last week, Dr. Lloyd G. Humphreys, assistant director of education for the National Science Foundation, resigned after only 15 months on the job since President Nixon appointed him. It was over the budget.

"We have had substantial cuts in funds to science education over the last two years" (SN: 7/24/71, p. 55), Dr. Humphreys told SCIENCE NEWS. "And the preliminary evidence for the 1972-73 budget show we are in for still another cut."

The crowning blow, says Dr. Humphreys, was the OMB apportionment of the 1972 budget that NSF received last week. OMB withheld approval to spend $30 million appropriated by Congress for institutional programs of NSF for science. Of the $622 million appropriated by Congress, OMB said NSF could spend only $592 million. NSF will thus have $98.1 million instead of $128.1 million for its science education programs.

The resignation, says Dr. Humphreys, is the result of a general and growing frustration over the continuing budget cuts and the resulting inability to initiate significant programs.

The Nixon policy of withholding funds—or refusing to apportion all of the money appropriated by Congress to the various Federal programs—has been the focal point for many angry partisan debates during the past year. Congress doubts the constitutionality of such a practice, since, according to the Constitution, Congress has the money powers for the nation. From the Administration's viewpoint, however, the Constitution gives the President the responsibility of the day-to-day management of the Government; thus,

say Administration officials, Nixon can withhold funds as he sees fit. In the 1971 fiscal year alone, the Administration impounded, or put into reserve, more than $12 billion appropriated by Congress.

Some of the money is not appropriated on a "yearly funding basis," so theoretically, the OMB could release the funds at a later date. However, say the opponents, when the funds are released, they are usually substracted from that year's budget request for the particular agency.

In response to the attack by Dr. Humphreys, NSF Director William D. McElroy, who himself has resigned effective next Feb. 1, issued a statement saying it would "be possible for the Foundation to offer a strong and well-balanced science education program in the fiscal year 1972 within the funds appropriated by Congress and allocated by OMB." □

CUT AT NASA POSSIBLE

Grand Tour, shuttle threatened

The National Aeronautics and Space Administration must submit its preliminary 1973 budget requests to the Office of Management and Budget (OMB) this month. In August, OMB gave the various Government agencies certain "guidelines" or budget levels acceptable for 1973, and the word is that NASA's may be as low as $3 billion for next year. If this turns out to be the ultimate figure, some observers say NASA may well be demoted to a "housekeeping level"—too large to be a "NACA" (the old agency, called the National Advisory Committee for Aeronautics) and too small to be a "NASA." Even at the same level of this year's budget, $3.3 billion, NASA would not be able to carry out the programs set forth in the 1972 budget.

The programs most vulnerable to such a cut include the unmanned Grand Tour of the outer planets, the Viking Mars landers, and the High-Energy Astronomical Observatory. On the manned side, the reusable shuttle would be felled.

Initially, NASA wanted to build a reusable booster and orbiter to replace all of the expendable hardware used for the last 12 years. This year, however, faced with the Administration's budget priorities, NASA has been considering a phased approach—building the reusable orbiter first and using expendable boosters until enough money is available (SN: 7/24/71, p. 56). But even to go ahead with this apporach, NASA would need a budget level above $3.3 billion.

The same type of situation exists with the Grand Tour. To do a first-class job of flying by all the outer planets when they are uniquely aligned during the latter part of this decade, NASA would like to use its TOPS spacecraft (Thermo-electric Outer Planet Spacecraft). The TOPS would have automatic self-repair capabilities to ensure the success of the nearly 4-billion-mile journey to Pluto. If the 1973 budget prohibits this, a Pioneer-type of spacecraft would have to be used. These less sophisticated craft would significantly reduce the complement of scientific instruments carried and have much smaller self-repair capabilities. □

PHOTOELECTRON SPECTROSCOPY

Studying electron behavior

Chemistry depends on what electrons do. Their motions, gains, losses and vibrations determine the nature of chemical bonds, chemical combinations and chemical changes.

One way to study the details of electron behavior is to knock electrons out of chemical substances, mainly with high-energy photons, and observe what happens. This subject, called photoelectron spectroscopy, is a "rather good example of the capricious way science used to proceed," says Dr. Kai Siegbahn of the University of Uppsala in Sweden. "Like a car with brakes and a gas pedal but no steering wheel it has followed a zig-zag path." The subject has an old history, but the last few years have seen developments that warranted the calling of an International Conference on Electron Spectroscopy, held last week at the Asilomar Conference Grounds in Pacific Grove, Calif.

The photoelectric effect has been known for decades, but the devices that use it, such as electric-eye doors, employ visible or nearly visible light to knock conduction electrons out of various solids. The thrust of the new developments in photoelectron spectroscopy is to use X-rays of various energies to spring more tightly bound electrons from atoms and molecules.

Such experimentation can aid theoretical chemists in developing a basic understanding of the behavior of electrons in, and the chemical structure of, complex chemical combinations.

More practically it can be used to analyze unknown samples for the elements in them. It can be used on smaller samples and with less destructive effect than other methods. For example, it has been used on minute samples of the substance called anomalous water and is responsible for a determination that anomalous water is not a polymer.

And to show that photoelectron spectroscopy is far from an ivory-tower subject, Dr. Thomas A. Carlson of Oak Ridge National Laboratory says that it has been used to determine how sulfur combines with air-pollution particles.

Photoelectron spectroscopy uses electromagnetic radiation of various energies including high-energy ultraviolet and soft X-rays. Dr. Carlson divides the experimental technique into two domains: using fairly low-energy radiation to dislodge electrons from the valence or outer shell of an atom and using higher energy X-rays to dislodge electrons from the inner, more tightly bound region.

In addition, there is a technique called the Auger effect (pronounced "oh-zhay") which uses electrons to cause a reaction in which an atom ultimately emits an electron. The Auger effect is of most use in studying solid surfaces since incoming electrons don't penetrate into the bulk of a sample anywhere near as far as photons do.

The outer or valence shell of an atom tends to belong to the substance as a whole. This is the region important in chemical bonding and molecular structure. One studies the behavior of these electrons, the orbits and vibrations they perform, to determine their effect on the nature of the chemical bonds, the binding energies and the chemical stability of the molecule that they belong to.

So far, says Dr. Carlson, such outer-shell studies have been done on a number of simple molecules. For the future he hopes to see more and more complicated molecules studied. It would be especially significant to work on complex organic molecules such as pesticides, to study homologous series of such molecules and determine the differences in the ways they may change, break down or persist in living tissue.

The inner-shell electrons are more closely bound to a particular atom. They feel chemical changes by alterations in the over-all electric field surrounding them. Here chemical shifts, changes in the way a given element combines with other substances, are studied.

Chemical-shift studies of the important elements carbon, nitrogen, oxygen and sulfur are less than half complete, and half the elements in the periodic table have not been touched. He sees much room for future work in this department.

Dr. Siegbahn, too, has a number of prescriptions for the future. Many have to do with more precise methods of determining data and with better modes of mathematical analysis including such things as on-line computers.

Another improvement Dr. Siegbahn hopes for is a way of studying liquids. Present methods do well with gases and solids but not liquids.

The use of two X-ray beams instead of one is yet another future possibility. One beam would excite the target molecule, the other would detach an electron. In this way molecular energy