observed sea floor spreading. Dr. Turcotte reports that calculated values of the heat flux to the ocean floors are in good agreement with observations.

The descending flow is associated with the oceanic trenches adjacent to continents, and seismic observations on these zones of deep earthquake activity support this interpretation, Dr. Turcotte says.

The volcanic activity and high heat flows associated with the trenches, he notes, can be explained by frictional heating by the descending oceanic crust.

Fluid dynamics may also be creating a science of vehicular traffic.

Vehicular traffic flow resembles a fluid and is "amenable to sophisticated mathematical attack," reports Dr. Robert Herman, head of the theoretical physics department of General Motors Corporation's Research Laboratories in Warren, Mich.

One approach used by traffic theoreticians describes the flow of traffic on the basis of the behavior of individual units—the driver and his car. When one motorist tries to drive along a highway behind another car in a stable manner, the motion of his car appears to obey a simple law.

Dr. Herman and his co-workers have derived a mathematical relation that describes this car-following phenomenon. It explains, for instance, why drivers seem to follow another car too closely—a driver, instead of responding to the distance between his car and the one ahead, attempts to keep at a minimum the difference in speed between his car and the leading automobile.

This follow-the-leader theory is helpful in examining the stability and flow characteristics of a line of vehicles under conditions of no passing. If a driver suddenly changes speed—slowing down because of an insect sting, for instance—this change can be easily absorbed by the next few drivers if they react quickly enough to the stimulus, and the situation will again be stable.

However, if the reaction time of the nearest following drivers is even slightly delayed, the change in the motion of the lead car may lead to a wave-like transfer of instability, a fluctuation propagated along the traffic line that can result in one or more tail-end collisions.

CANCER THEORY

Starve the tumor, not the cell

Research done at the Chicago Medical School may be helping to point the way toward a new route of attack on certain cancerous tumors.

Drs. Melvin Greenblatt and Philippe Shubik, reporting at the annual meeting of the Federation of American Societies for Experimental Biology, say their animal experiments demonstrate for the first time that transplanted tumors release a chemical into the host's bloodstream that causes the host to produce blood vessels to supply the tumor. Existence of such a substance has been suggested before but not demonstrated.

If such a factor can be identified in human cancers, and if it can be suppressed without harm to the patient, it might be possible to prevent the vascularization of tumors. Since tumors above a certain small size require a blood supply to live, they might by this method be starved to death.

Current approaches to cancer treatment often try to exploit the small differences between cancerous and normal cells. Cancer cells are more susceptible than normal to certain toxic substances, for instance.

The development of an effective weapon against the tumor, rather than against the cells of which it is composed, might be applicable to a far wider range of cancers. And there is no known reason why short-term suppression of the body's process of blood-vessel building should be too harmful to the patient.

Any human benefits of the new work are still far off, however, primarily because the blood-vessel attractant hasn't been found in humans yet, nor has it been characterized.

The experiment reported involves inserting plastic windows in the cheek pouches of hamsters. Malignant melanomas then are transplanted under the windows. Those tumors in contact with the hamster's tissues develop a blood supply system as is usually observed in such transplants. A blood supply develops even when tumor and hamster tissue are separated by a porous membrane.

This membrane allows passage of proteins and other substances, but no direct tissue-to-tissue contact. A cellophane membrane which allows the passage of small molecules but not large molecules like proteins prevents development of blood vessels.

From this it is theorized that a substance, christened angiogenin, is released by the live tumor and stimulates the proliferation of blood vessels around and into the tumor. Angiogenin is assumed from the membrane tests to be a substance of medium to large molecular size.