

biomedical sciences

Skinner conditioning lessens pain

B. F. Skinner is probably the most influential psychologist alive today. Certainly he is one of the most controversial. His concept that conditioning can modify one's behavior is being used not just in psychology but in traditional medical science.

Wilbert E. Fordyce and his team of rehabilitation medicine specialists at the University of Washington School of Medicine decided to view chronic pain as learned behavior instead of as physiological pathology (the classic view). They selected 36 patients with chronic pain for a four-year study. During the study they attempted to lessen the patients' pain by conditioning. They encouraged the patients to stop talking about their pain, to reduce their intake of pain-killing drugs, to get more exercise and to work and socialize more. When the study ended, the patients said they suffered considerably less from pain, the investigators report in the September ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

"More work," they conclude, "is needed to identify in more detail the factors which indicate a patient's pain behavior is under control of environmental consequences rather than of tissue pathology."

Role of messenger RNA in heredity

DNA contains the genes of a cell. Messenger RNA translates its instructions into proteins. But apparently mRNA, exclusive of DNA, can influence cell differentiation and the passage of inherited characteristics, Niu Manchiang of Temple University and Tung Ti-chou of the Chinese Academy of Sciences have found.

The American and Chinese biologists extracted mRNA from mature carp eggs, purified it, then injected it into freshly fertilized goldfish eggs. Of the 320 fry born, 106 had a single tail fin, characteristic of carp. Goldfish have a double tail fin. These results, the biologists say, show that mRNA plays a significant role in cell differentiation and heredity.

This is the first significant scientific result to emerge from a cooperative effort between American and Chinese scientists since the United States reestablished relations with mainland China.

Pregnant women vulnerable to disease

Women who contract German measles during the first several months of pregnancy stand a good chance of giving birth to defective infants. Now women have even more reason to avoid exposure to German measles during pregnancy. Scientists at the Georgetown University School of Medicine have found that women's natural cell-mediated immunity against German measles is lowered during pregnancy. Cell-mediated immunity constitutes an important defense against viral infections. Y. H. Thong and his pediatrics research team report the finding in the Sept. 20 NEW ENGLAND JOURNAL OF MEDICINE.

"Diminished cell-mediated immunity during pregnancy may represent an adaptive maternal response to protect the fetus from rejection," says Thong. "At the same time it predisposes the mother to increased risk of infection. In our study, the impairment was only temporary, and immune function returned to normal after pregnancy."

Women are also known to have unusually severe cases of polio, hepatitis and other viral infections during pregnancy. So their immune defenses against all viruses might well be weakened at this time.

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environmental sciences

Neglected dangers of thermal pollution

Most urban dwellers have experienced the swelter of a summer night in the city, but higher temperatures in the atmosphere over such "heat islands" may have more insidious effects, which urban planners seldom consider. James T. Peterson, a research meteorologist on loan to the Environmental Protection Agency from the National Oceanic and Atmospheric Administration, reports some of these effects in the October ENVIRONMENT magazine.

The earth absorbs about 200 watts per square meter of solar energy. Manhattan Island has an energy consumption density of 630 watts per square meter. Electrical generating plants may deliver 10,000 watts per square meter to the atmosphere. In areas where man-made power so far exceeds that coming from the sun, both local and regional climatic changes can occur.

The immediate area around Washington, D.C., for example, has nearly a one-month longer growing season than outlying rural areas because of city-generated heat. Less snow falls into many cities because it melts in the warm atmosphere overhead. On the other hand, areas downwind from cities often receive 5 to 10 percent more precipitation from moisture carried aloft by artificially created convection currents. Urban-rural temperature differences can be as high as 18 degrees F.

Global energy use will quadruple by the year 2000. By then, an estimated 60 percent of Americans will inhabit only 8 percent of the land and the increased generation of electricity by nuclear reactors may only worsen thermal pollution by producing as much as 55 percent more waste heat than comparable fossil fuel installations.

Predictions on how global climate could be affected must await development of better mathematical models and faster computers (SN: 10/13/73, p. 236), but Peterson concludes: "Continued growth of energy use could lead to large-scale climatic change in 100 years or more."

Asbestos in Lake Superior

In a privately copyrighted article in the September ENVIRONMENTAL ACTION, Ralph Nader and Robert Harris accuse the Reserve Mining Co. of endangering the lives of Duluth, Minn., residents by dumping hundreds of millions of tons of asbestos into Lake Superior.

"In less than 20 years," they claim, "Reserve has managed to discard into this one lake as much asbestos as the entire United States would demand for a century of commercial use at the present level!"

Lake Superior is generally considered the cleanest of the Great Lakes, and Nader and Harris say that the dumping of mine tailings by Reserve Mining is the only significant source of such pollution in the lake. As many as 150,000 lakeside residents, they say, may be ingesting dangerous amounts of asbestos, which is credited with causing high cancer rates among asbestos workers.

"The average daily intake of asbestos ingested by a Duluth resident," they contend, "may be equivalent to that breathed by asbestos workers during a typical work day."

The authors also score the Environmental Protection Agency and the Minnesota Pollution Control Agency for failure to use their emergency powers to stop further dumping of the asbestos.

Court suits on various aspects of the problem are in progress. An EPA official told SCIENCE NEWS that until the suits were settled, the agency could not comment on the Nader-Harris article.

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