Behavior

A 'beta' approach to learning

Benzodiazepines, a group of antianxiety and anticonvulsant drugs that include diazepam (better known as Valium), have been found to interfere with recent memory and learning. French scientists now report that an anxiety-promoting drug—one of a group of chemical compounds shown to have properties opposite to those of benzodiazepines—enhances performance on three learning and memory tasks, at least among mice and chicks. Human trials have not yet been conducted.

The memory effects of methyl ß-carboline-3-carboxylate (ß-CCM) were compared with those of diazepam. In the first experiment, mice deprived of food for 24 hours were placed in an unfamiliar cage containing an unlimited food supply. Mice injected with ß-CCM (in doses much lower than those that produce anxiety or convulsions) or diazepam just before entering the cage behaved the same as controls who received no injections, exploring the surroundings but eating practically nothing during the 30-second exposure. Four days later, the same mice were again placed in the cage after a 24-hour fast. The control group ate much more, presumably because they had become somewhat accustomed to the enclosure. Mice given ß-CCM ate about twice as much as the controls, and diazepam-treated animals consumed much less than controls. Food intake did not surpass that of controls, however, when ß-CCM was administered in high doses.

Moderate injections of ß-CCM similarly improved the avoidance behavior of mice who had previously entered a dark box where mild electric foot shocks were delivered. In contrast, diazepam-treated mice had difficulty avoiding such a box even if previously exposed to high-intensity shock.

The investigators then found that ß-CCM enhances the retention of imprinting (time spent following a moving decoy) in newborn chicks, while diazepam interferes with imprinting.

ß-CCM may increase an animal's level of arousal and thus improve learning during a training session, Patrice Venault of the French National Center for Scientific Research in Gif-sur-Yvette and her colleagues report in the June 26 NATURE. Conversely, they say, diazepam may reduce arousal. But the precise way in which benzodiazepines interfere with both learning and retention of short-term memories in humans, note the researchers, remains unknown.

Alcoholics: Where's the treatment?

Several researchers have noted that physicians often have negative attitudes toward alcoholics and vary widely in their willingness to treat alcohol abuse. Wayne D. Mitchell and his colleagues at the University of Colorado School of Medicine in Denver now report that although physicians at a university teaching hospital usually note symptoms of alcohol abuse, they often fail to refer alcohol abusers for appropriate treatment or to follow up on the condition of these patients.

The investigators examined the charts of 163 patients consecutively admitted to University Hospital in Denver. Alcohol abuse was checked for in 127 cases, and 27 patients were tagged as alcohol abusers. This screening record "is not discouraging," they say. But of 39 patients identified as alcohol abusers and released from the hospital during the two months before the chart review, only eight received psychiatric consultations or treatment referrals. Referral to Alcoholics Anonymous was never made.

What causes this neglect? Faculty seldom spend as much time teaching residents about alcoholism as about other disorders, note the researchers in the June PSYCHOSOMATICS. Alcoholics' initial denial of problems and resentment toward treatment are stoked by the inadequate efforts of these physicians; in a vicious cycle, as patients' denial increases, physicians become even more reluctant to pursue treatments.

Biology

Absolutely swimming in bacteria

With all its power and immensity, the ocean has been regarded as a wonderful dump site for human wastes. The wastes are treated before they reach the ocean, after all; and the idea is that any pathogens that survive are doomed in the vast and inhospitable sea. But according to an ongoing study developed for the Office of Technology Assessment (OTA), bacteria may survive quite nicely. They may be swimming alongside you the next time you take a dip in coastal waters.

Previous studies have concluded that seawater is deadly to bacteria, because after exposures as brief as a few hours they won't grow in normally supportive media. But according to Jay Grimes of the University of Maryland in College Park, a more sensitive laboratory technique now shows that some bacterial survivors have merely become dormant.

Grimes and his colleagues collected samples of coastal waters and incubated them with a food source and an antibiotic. Since the antibiotic prevented any bacteria surviving in the samples from dividing, bacteria that ate even small amounts were marked by their aberrant size, even if they were so quiescent as to appear dead. Grimes found that several species of human pathogens—including bacteria that cause cholera and dysentery—can survive for days in seawater. "And when we recover them, they're still capable of causing disease in experimental animals," he says, adding that he believes the bacteria would have the same capability in humans. The bacteria return to normal levels of activity after passing through the experimental animals.

"It's of concern because the [sewage] treatment doesn't kill all the pathogens," Grimes says. "We're slowly but surely building up a reservoir of these pathogens in coastal waters."

Sowing antiviral seeds

Viruses are a hardy bunch. They survive exposure to many potent chemicals unscathed, and most compounds that *can* kill them wipe out the host cell as well. In Vancouver, researchers at the University of British Columbia are working with a class of phototoxic plant compounds that, they say, show promising though preliminary signs of antiviral activity.

Phototoxic compounds can cause allergic reactions, and sometimes illness or death, when they are eaten or touched by an animal that is then exposed to the ultraviolet A radiation in sunlight. But at last month's annual meeting of the American Society for Photobiology in Los Angeles, Neil Towers reported that five such compounds, found in plants of the marigold and sunflower families, appear to be even more toxic to viruses than to animal cells.

Towers and James Hudson grew Sindbis virus and mouse-cytomegalovirus in mouse cells, then exposed the cultures to the phototoxins in varying concentrations. According to Hudson, "relatively low" concentrations of the compounds destroyed the viral membranes while leaving the membranes of the mouse cells undamaged. The compounds appear to act on unsaturated fatty acids in the viral membranes, Towers says. Though the viruses were still able to penetrate the host cells, they were "essentially killed," since they were no longer able to replicate.

There are other phototoxins that appear to have antiviral activity, the researchers say, many of them derived from plants traditionally considered to have medicinal value. Some of these compounds disrupt the virus's genetic material and are more likely to have harmful side effects on the host cells.

The researchers have not yet tried the membrane-specific compounds in animals, but if *in vitro* results are borne out, Hudson says, there is the potential for a new class of drugs, potent against many viruses but without some of the serious side effects that occur with other antiviral drugs.