

Drugs Rely on Rhythms

A poison is always a poison. Or is it?

It may depend on the time of day it is given.

By the same token, a life-saving drug, administered to a dying man at the wrong hour, may lose all its healing powers.

Circadian rhythms, natural peaks and valleys in the daily cycle of physiological activity, account for this phenomenon which has far-reaching applications for medicine and science.

As physiologists gain greater insight into man's time scale, it will be possible to know not only what dose of a drug to give patients, but also at what time of day it should be given.

Studies of rats given potentially lethal doses of amphetamine, a common stimulant of the central nervous system, showed that its action varied significantly over a 24-hour day. Dr. Lawrence E. Scheving of the Chicago Medical School reported that up to 78 percent of the rats died at certain hours, while at other times amphetamine was fatal to only 6 percent.

Once the good and the bad hours have been determined for one group of animals, it can be safely predicted that others of the same species will respond in the same way, Dr. Scheving told the American Association for the Advancement of Science meeting. Similar rhythmic results were found in animals tested with nicotine, strychnine and other drugs, he said.

The relation of body rhythms and susceptibility to drugs was first noticed by Dr. Franz Halberg and his colleagues at the University of Minnesota who have also found reactions to physical stimuli such as noise rhythmically.

Some attempts to apply this knowledge to clinical medicine have been made, though no fool-proof way to use it has been found. Dr. Richard J. Wurtman, an endocrinologist at the National Institute of Mental Health relates rhythmicity to the treatment of Addison's disease which results when the adrenal gland fails to secrete enough hormones. Hormone injections help, but patients seldom feel completely well, Dr. Wurtman said, and "one reason is that we can't quite duplicate the natural rhythms of these secretions." Normally, though, they seem to be highest in the blood about 6 a.m. and lowest at about 10 p.m.

Friedman on X-Ray Stars

The Milky Way galaxy, the giant congregation of hundreds of millions of stars in which the earth and its planets are located, contains some 4,000 objects that pour out more radiation in X-rays than in visible light.

So far 30 of these have been identified, Dr. Herbert Friedman of the Naval Research Laboratory reported. The most powerful source is Scorpio XR-1, the first whose location was pinpointed. Dr. Friedman termed it the "most interesting" X-ray object in the heavens.

Scorpio XR-1 could be a neutron star radiating from deep within a gas cloud having a temperature of 50 million degrees. Embedded in this huge hot corona, the neutron star has a temperature of about two million degrees.

A 13th magnitude star has been seen at the position of Scorpio XR-1, Dr. Friedman told the American Association for the Advancement of Science meeting. This is about the photographic magnitude expected for a small object radiating from within a large and very hot gas cloud.

The number and distribution of X-ray sources within the Milky Way help give scientists a better picture of the galaxy's structure and formation. One feature of the distribution that stands

out clearly, Dr. Friedman said, is that there are two regions of strong clustering—one near the galactic center and the other in the spiral arm associated with Cygnus.

The 30 X-ray sources appear to fall into two classes, those accompanied both by radio waves and optical emission, and those unidentified with any particular radio or optical source.

Besides Scorpio, Taurus XR-1 is another source positively identified. It is the debris still spewing spaceward from the earth's most brilliant "firecracker," the explosion of the Crab Nebula on July 4, 1054.

Dr. Friedman reported that there is a good chance that signals detected from one source, an object known as M-87, represent X-rays that have traveled through intergalactic space. He suggested that M-87 should be called an X-ray galaxy instead of a radio galaxy, as it is now termed.

He noted that at least one, and very likely several, X-ray sources vary greatly in brightness in less than a year.

Exactly what will be found from the rare objects that radiate so strongly in the X-ray region cannot be told now, because even their existence is a puzzle for which scientists as yet have no answer.

ENTOMOLOGY

Sound, Light Lure Bugs

Silent sound and invisible light are being used to ward off a possible "silent spring."

Department of Agriculture engineers, working with entomologists, are successfully luring specific insect pests with ultrasonics and ultraviolet to cut down on the amount of chemical pesticides needed to protect crops.

The department's \$70 million a year pest control research budget is now devoted 79 percent to non-chemical means of eradication. Asked if this "steady shift" away from the chemical poisons was caused by Rachel Carson's book, "The Silent Spring," assistant secretary of Agriculture George L. Mehren denied it. "We are simply trying as best we can to reduce any residual pollution to the soil or waters," he declared.

Tests on the tobacco hornworm, a serious pest of tobacco and tomatoes, show they are attracted by certain wavelengths of light and sound, both unnoticed by humans, according to Dr.

W. M. Carleton, director of the Agricultural Engineering Research Division.

In some tests, the eye of the adult hornworm moth is wired to an ocellus. Different wavelengths of light are played upon the insect, and its response, in terms of electric discharges can be read. In other tests, the moths are released among a variety of light sources and allowed to flutter to the one they like best. Both tests show the ultraviolet to be most attractive.

Light traps using that end of the spectrum are up to 85 percent successful in ridding a given area of the moths, Dr. Carleton told the American Association for the Advancement of Science last week.

Tests in North Carolina, he said, had one flaw—the inward migration of moths from outside the study area. To remedy this, tests are now being carried out on the island of St. Croix in the American Virgin Islands, with light and sound traps spread over the whole, isolated, island.