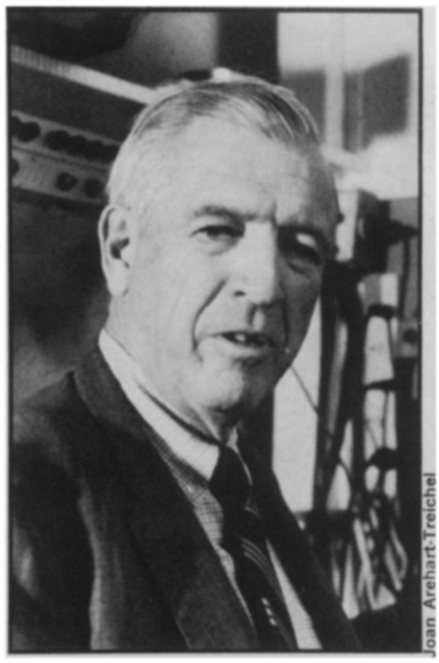
SCHOOL LIGHTS AND PROBLEM PUPILS

Hyperactivity may be stimulated by certain kinds of fluorescent lights in schools

by Joan Arehart-Treichel



Ott: "Fantastically easy to correct."

Some million American children are estimated to be hyperactive—obsessed with an abnormal restlessness that keeps them from functioning happily and productively. Many of them are being treated with amphetamines, drugs that normally produce a stimulatory effect but, for some reason, tend to sedate hyperactive children. Such treatment, understandably, is less than satisfactory. Even if it doesn't encourage children to abuse drugs later in life (SN: 4/6/74, p. 224), it can only counter the problem, not correct it. So it would be of great benefit to hyperactive children if the cause, or causes, of hyperactivity could be pinpointed.

Hyperactivity, medical investigators believe, may derive from a disorder of the central nervous system (SN: 1/8/72, p. 27), from chemical imbalances in the body or even from lead poisoning (SN: 12/9/72, p. 377). But John Ott of the Environmental Health and Light Research Institute in Sarasota, Fla., believes that inadequate and harmful fluorescent lighting in school rooms may be a cause of hyperactivity, or at least a stress that alters the body so that hyperactivity results. Ott's belief stems from a pilot project he conducted last year with the help of the Sarasota County School Board.

The project was conducted in four first-grade classrooms in a Sarasota elementary school. There were 30 students per classroom, each of which was windowless and lit by standard cool white fluorescent lights. Several children in each of the classes were hyperactive and close to being transferred to a special school.

Two of the classes continued school under the standard lighting equipment. New lights were installed in the rooms attended by the other two classes. These lights, designed by Ott, included long ultraviolet wavelengths (from 2,900 to 4,000 angstroms). These wavelengths are present in sunlight but virtually lacking in conventional fluorescent lights. The new lights also had lead foil shields over their cathode ends to keep X-rays from escaping and a wire grid screen over their entirety to ground radio frequencies. Ott had also mounted, unknown to the children, a camera near the ceiling of each of the four classrooms. Time-lapse pictures were taken while the classes were in session.

The project was completed in 90 days. The time-lapse photos suggested that the hyperactive children improved their behavior under the new lights, but not under the conventional ones. The teachers in the two experimental classrooms reported an improvement in behavior and learning for the hyperactive youngsters—enough so that they did not have to be transferred.

In one of the two experimental rooms, there was a boy who had been a virtual acrobat. But in his new environment, he stopped his acrobatics and moved from the last row of the class to the front row. He started raising his hand to answer questions (see before and after photos, below). His teacher reported that he learned how to read and was even doing independent study. The teachers in the two control rooms did not report comparable improvements in their hyperactive pupils.

The photos revealing the students' behavioral changes during the 90-day period, the students' academic achievement, disciplinary referrals, absenteeism, and other factors bearing on the study are now being analyzed by Lewis

Overactive under fluorescent lights (above), one student becomes more attentive after lighting is changed (next page).

W. Mayron, a biochemist with the Veterans Administration Hospital in Hines, Ill. Mayron says his preliminary analysis suggests that the hyperactive children's behavior and scholastic achievement improved because of the new lights. But he wants to complete his analysis to make sure that the improvement was indeed the result of the lights and not the result of some other environmental factor or of teacher differences between the classes.

Meanwhile, Ott and the Sarasota school board have expanded the studies to include 250 students in kindergarten and the first and second grades. Sold on the promise of the Sarasota research, the Michael Reese Hospital in Chicago is installing Ott's lights in their psychiatric ward and in their Dysfunctioning Child Center, where the effects of the lights on hyperactive children will be studied with cameras.

"If hyperactivity indeed proves to be a radiation stress condition," Ott says, "it will be fantastically easy to correct the problem—simply install lights that contain those light waves that are missing in standard artificial light sources and eliminate X-rays and radio waves." With the help of his son Henry, Ott has designed fluorescent lighting that meets these specifications. Fluorescent lights that add long ultraviolet rays and that have lead shields to block X-rays are now commercially available. Some lighting companies are also interested in marketing fluorescent lights that shield off radio waves.

Ott's concept that conventional fluorescent lights may cause or aggravate hyperactivity is not a chance one. It is based on observations he has made and photobiological research he has conducted for close to 50 years as one of the nation's outstanding time-lapse photographers. While photographing flowers opening and closing and pumpkins growing from seed for Walt Disney films, Ott observed that plants are adversely affected if specific light waves are missing in artificial light sources. He found that if apples were placed in a conventional greenhouse, which prevents long ultraviolet rays from filtering through, the apples wouldn't mature and ripen. If morning glories were deprived of infrared rays during their dark period, they wouldn't bud. Female flowers on Cinderella's pumpkin plant wouldn't blossom under cool white fluorescent lights (which are rich in orange and yellow rays, but lack ultraviolet, blue and red rays). Male flowers on the plant wouldn't blossom under daylight white bulbs (which are strong in blue lengths and lack everything else). It appeared, then, that if plants were to flourish, they needed those waves of the light spectrum that are normally available to them in nature, but not necessarily in artificial lights.

Ott theorized that animals probably need specific waves of the natural light spectrum to function well too, and that these waves may not be available in different kinds of artificial light. He set up experiments to test the hypothesis. He found that male rats, mice or rabbits kept under standard fluorescent lights tended to be irritable and to cannibalize their young. Those placed in the presence of natural sunlight or under fluorescent lights containing long ultraviolet wavelengths were docile, friendly and helped care for their young. Of 536 mice born under long ultraviolet rays added to fluorescent lights, all but 15 survived to maturity (97 percent). Under conventional fluorescent lights, 88 percent of 679 mice survived to maturity. Survival was 94 percent under cool white light (rich in yellow and orange waves), warm white light (stronger in yellow and orange than cool white light is) and daylight white light (which has more blue in it than the cool and warm white lights do). Survival was only 61 percent under pink fluorescent lights (which are strong in pink wavelengths).

These and many other experiments convinced Ott that people are also healthier if they are exposed to the total light spectrum available in nature, and that being deprived of specific wavelengths, particularly of the long ultraviolet ones, might well create disease states, such as hyperactivity.

Ott's hypothesis that conventional fluorescent lights give off X-rays that may trigger hyperactivity is also based on ample observations and research. When he photographed flowers for the Barbra Streisand film "On a Clear Day You Can See Forever," he noted that flowers nurtured under high-power fluorescent lights didn't grow well near the ends of the tubes. He put bean sprouts near the ends of the tubes and found that they didn't grow well (evidence that has since been confirmed by Byron Tepper, a microbiologist at the Johns Hopkins School of Hygiene and Public Health). He exposed rats to the ends of the tubes and found that the rats became hyperactive. Then in 1972 he helped the Sarasota school board determine that some of the hyperactive children in a special school in Sarasota came from homes that had X-ray-leaking television sets. When the sets were removed or repaired, the children were no longer hyperactive.

Ott's premise that radio waves in standard fluorescent lights might contribute to hyperactivity is largely based on research by Allan Frey, a biophysicist with Randomline Inc., Willow Grove, Pa. Frey found that animals experienced changes in behavior and transient changes in their central nervous systems after they were exposed to radio and television frequencies.

Ott's work with fluorescent lights and hyperactivity obviously has to be not only expanded but confirmed by other investigators before conventional fluorescent lights can be indicted as a cause of hyperactivity. But if the results do lead to an indictment, the clinical value could be enormous—not just help for a million hyperactive youngsters but perhaps help for persons with other kinds of diseases. Hyperactivity is just one of the medical problems, Ott believes, that is caused or at least aggravated by inadequate or harmful artificial lighting conditions. □

Photos: Henry Ott