Ever Have a Dumb, Primitive Suspicion of Fluorescent Lights? Well...

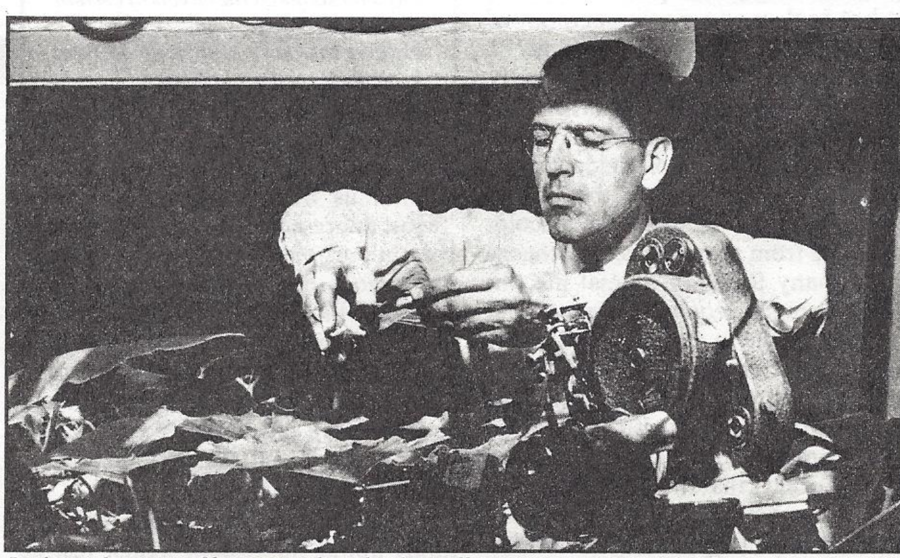
THEY BLIGHT UP YOUR LIFE

By John Rothchild

JUST ABOUT AN hour's drive from a lab where Thomas Edison worked on artificial light, John Ott has been looking into that light with some suspicion. Ott has some unsettling things to say about the artificially concocted combinations of wavelengths that emanate from incandescent and fluorescent bulbs and from television sets, and that are especially harmful to people who spend more time under light bulbs than they do under the sun. Ott is convinced that wavelength deprivation, a kind of illuminative scurvy, is a contributing factor in a variety of maladies, from cancer to arthritis to hyperactivity in children.

The growing number of Ott's supporters are as diverse as the maladies. They include eye specialists, botanists, cancer researchers, florists, light bulb manufacturers, chinchilla breeders and school psychologists. And even the management of a minor-league baseball team, which thanked Ott for improving the disposition of a player by suggesting that he stop wearing his pink sunglasses.

The number and variety of supporters are even more impressive when you consider Ott's unusual approach to science, as evidenced by his trip to the Sloan-Kettering Institute for Cancer Research last summer. Ott was invited to lecture



Photos by John Ott

In the early years of his research, John Ott pollinates a pumpkin under fluorescent light. The pumpkin flowers grew quite differently under daylight.

the cancer people. It was an important opportunity, not only because Ott spends most of his time worrying about light and cancer these days, but also because some of the cancer people have resisted his arguments in the past. Part of their resistance stems from the fact that Ott has no formal scientific training—didn't even go to college—yet still has the gall to stand up to experts who outdegree him by a factor of ten. ("They reject my ideas because they say there is no precedent for them in the literature," Ott explains. "I tell them that if a cure for cancer was already in the literature, they surely would have come across it by now.") And part of their resistance is based on the fact that Ott's great ideas come to him while he is taking pictures of pumpkins for Walt Disney or of flowers for Barbra Streisand movies. The notion that a cure for cancer could be a by-product of Hollywood makes test tubes rattle in serious research labs.

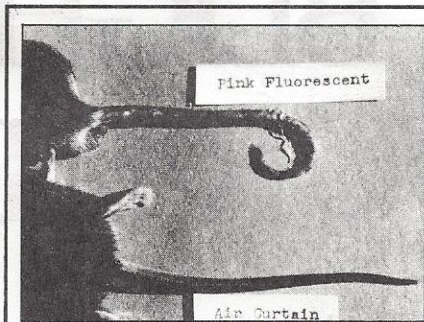
Given this entrée with Sloan-Kettering, a less hardy person than Ott might have tried to downplay such show biz associations, or at least declare that he had given up his photographic career in favor of serious scientific work. But Ott did just the reverse. "While I was in the neighborhood," Ott says, "I decided I could pay for the trip by taking some time-lapse pictures of the floats in the Macy's parade for NBC News."

It is just this kind of side trip that makes Ott continually suspect to sober science — would Einstein have interrupted relativity to do the box scores for the Washington Senators?—but Ott's great discoveries *depend* on these divergences. His revelations come as a result of chance meetings with eye doctors at garden parties, well-timed letters from chinchilla breeders, accidents with his own eyeglasses at the beach or the purchase of the wrong kind of light bulb at the store. If he is part of a scientific tradition, it is the tradition of invention-by-mistake and brilliance-by-coincidence that seems more a part of Descartes' century than of our own. In an age of strict scientific professionalism, Ott has broken an amazing amount of ground just by bumping into things. "I solve many problems," he says, "in my own simple way, by trial and error."

In his own simple way, Ott has managed to fuse a lifetime of incidental observations into a theory, a theory that has evolved over 40 years like a sculpture made from spare parts. The theory is that many forms of animal life, including humans, require a balanced diet of light—taken in through the eye—much as they require a balanced diet of nutrients. Animal organisms use light not only to see with but also as a kind of master control for parts of the glandular system. Ott says that the pituitary gland, that mystery organ, is actually programmed to pick up messages from the eye, and that those messages depend on the particular wavelengths that strike a layer of retinal cells called the pigment epithelial. These cells have no known visual function.

If you've misplaced your high school physics book, natural sunlight can be broken down into various wavelengths, which represent the colors of the spectrum. Ott believes that animals are much more sensitive to these various wavelengths than was previously assumed. In earlier generations, when people got plenty of direct sunlight, you wouldn't have found many victims of what Ott calls "malillumination." But as people spend more of their time behind light-distorting glasses and sunglasses, behind tinted windshields and plastic-coated picture windows, and under artificial lights, the traditional wavelength diet has been replaced by an unhealthy, man-made substitute.

"Most artificial lighting, incandescent or fluorescent, does not duplicate the full spectrum of wavelengths that reaches us from sunlight," Ott says. "Most fluorescent tubes emphasize only certain portions of the spectrum to create various decorative effects, such as 'natural white.' The typical incandescent bulb contains virtually no ultraviolet, and it is also lacking in the blue end of the spectrum." At one time these details had meaning only for decorators, but now Ott has introduced them to doctors and psychologists.



Before & After: *The dramatic difference in the tails of laboratory mice who have lived their entire lives under pink fluorescent light* (top) *and natural daylight* (bottom) *illustrates Ott's thesis about the effects of certain kinds of artificial light. Other key experiments have been done on rats, bean plants and grass blades.*

There are a lot of people who feel funny about fluorescent lights, just as there are people who feel funny about artificial foods and x-rays and a variety of other modern advances. Since these people have had no science to back them up, they have had to limit their criticism of fluorescents to statements of cultural displeasure, such as "This place is lit like a Highway Patrol station." But if Ott's suppositions are correct, artificial lighting is just one more area where regular people have harbored unrefined skepticism, have been debunked by legions of experts and then have discovered that they were right all along.

Bean Plants and TV

To get some sort of clue as to whether this guy was on the level, I visited Ott at his home in Sarasota, Florida. The first thing that struck me was the lack of that superficial eccentricity that I assumed attached to all such quantum leapers. At Edison's place nearby, where a lot of this light trouble got started, the house exudes eccentricity—in spite of having been controlled by unctuous tour guides for the last 30 years. Ott's place is a simple beach house. Except for the transparent blue light bulbs and the window film that lets in sunlight (his neighbors put up film to keep it out), Ott's house is devoid of hints that he has spent his entire adult life tinkering with cameras and lights.

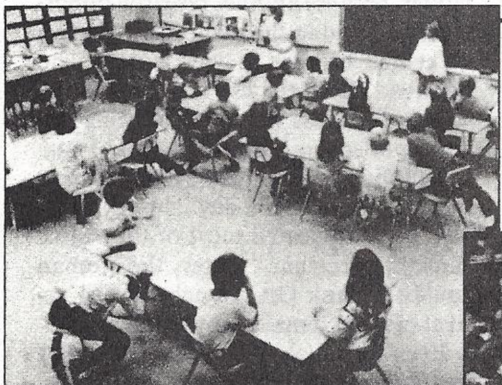
Ott is pushing 70. At first meeting he strikes you as more the career foreign service officer than the wild-eyed inventor. He even looks like a foreign service officer—tall, white-haired and slightly reserved. Ott is also friendly, well-spoken, polished and genteel. He has a sense of humor that has survived years of frustration, when his ideas were treated as if he had found them in an orgone box. "A lot of doctors who saw films of my research were convinced that there was something to it," Ott says. "But then they told their colleagues, who said they had gone off the deep end."

The man himself seems believable enough. Aside from his unorthodox research style, and a history of flirtations with pumpkins and Disney and NBC, Ott's main acceptance problem comes from his insistence that the scientific community recognize his theory in its entirety. Some of his friends have urged him to downplay the wilder suggestions ("One doctor told me to quit trying to cure cancer by shining a light in people's eyes," Ott says) and concentrate on things like the harmful radiation given off by television sets.

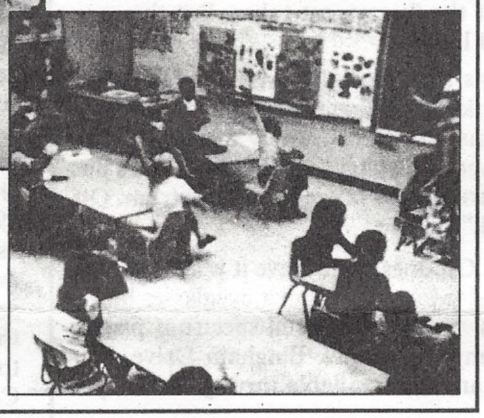
In 1965 one of Ott's simple experiments shook up the television industry. He took some bean plants and put them in front of a color TV. The plants were hidden behind a black paper screen, so visible light did not reach them from the television. Half of the plants were also protected behind a lead shield, which blocks out the non-visible radiation; the other half were not. The unshielded plants exhibited some pretty strange behavior, like growing their roots up instead of down. This experiment caused some embarrassment among television industry officials, who had said that TV sets complied with the industry's voluntary radiation standards and posed no danger to health. Ott contended that the amount of radiation given off varied widely. The thought of what the human counterpart to the plant weirdness might be led one manufacturer to clear its throat and recall a few TV sets. It also persuaded the government to lower the amount of allowable TV radiation. Ironically, the amount permitted under the new law is no different from the voluntary standard already touted by the industry, which Ott says is still a good deal too lax.

Ott also put rats in front of television, and he found them to get as lethargic as a child watching Saturday morning cartoons. Ott suggests that the content of television programming might not be nearly so harmful as the content of the light and radiation a TV gives off. But, in typical fashion, he declines to become a professional television gadfly.

Instead, he is thinking about why rats get more tumors under pink fluorescent lights, why sunglasses might be dangerous, why retinal cells in the pigment epithelial respond to light more than to certain drugs, and a variety of other matters that make up Ott's overall theory of health and light. Ott spends most of the afternoon pulling articles and tracts out of a closet bookshelf in an attempt to expose me to all the ramifications of his theory. If all of this turns out to be right, then Ott has run into a scientific governing principle as important as the discovery of the virus.



Before: Left: *in a windowless classroom under ordinary fluorescent lights, first-graders show many signs of restlessness and inability to sit still.*



After: Right: *after 60 days of full-spectrum lighting, children are in their seats and watching teacher, and boy who was banging his head on table is at front with hand raised.*

A Maladjusted Pumpkin

Ott's whole idea is so entwined with the events in his life that it can only be approached chronologically. Ott confounds traditionalists by fluttering between opposing branches of science with the dexterity of a hummingbird and the audacity of a second-story man. He never stays on one subject for very long, and the surprising thing is that later involvements somehow magically produce clues that help explain mysteries abandoned earlier.

Ott stops shuffling through papers and sits down to tell me about it. He joined the family bank in Chicago (which explains where he got a lot of his research money) in the 1920s, and was headed for a genteel banker's life until he got sidetracked by the plants in his basement. He had pursued time-lapse photography as a hobby since high school, but playing with plants and light began to interest him more than playing with money. He even invented some elaborate time-lapse machinery, cameras on long spindly arms that moved up and down in his basement, waving like wheat in a breeze. Ott's photographic accounts of the openings and closings of various plants and flowers were good enough to impress a lot of corporations, who hired him to do photographic studies, and Walt Disney, who hired him to take all the time-lapse pictures for his nature movies. By the 1940s, Ott had left the bank to devote himself full time to his cameras. "I can still hear one old-timer in the bank explaining that I was leaving in order to have more time to take pictures of African violets and apple blossoms," Ott remembers.

One of Ott's key discoveries came when he was filming a pumpkin for Walt Disney's *Secrets of Life* in his basement studio outside of Chicago, where he did his early work. The pumpkin was resting comfortably under fluorescent lights. It developed normally until the point when female flowers appeared. They shriveled up and dropped off. "I needed the pictures," Ott says, "so I got another pumpkin and tried it again the next year. This time the female flowers opened, but the male parts didn't."

This puzzling situation might have been cause for pumpkin dissection or soil sampling in established botanical circles, but Ott rejected such routine thinking and just let his mind float around the room. It attached to the fluorescents. "I remembered," Ott says, "that I had changed bulbs between the first year and the second." He had used regular fluorescent tubes when the female flowers withered, and "daylight white" tubes before the male flowers faltered. Ott had discovered earlier that a distortion in the wavelengths of light reaching various plants through panes of window glass could do things like retard the ripening of apples. Now he wondered whether the difference in the wavelengths given off by two kinds of fluorescents could possibly affect the sexual development of pumpkins.

It sounded silly, but Ott was never afraid of silly-sounding speculation. In fact, the pumpkin episode contains all the peculiar elements of the Ott style of research, which appear again and again in the stories he tells me. There is the unlikely conclusion drawn from an apparently unrelated detail. There is the dropped hint and the jump to another subject. Ott imported a pumpkin to pollinate the female flowers and took his pictures, and that was the end of the pumpkin episode. But it wasn't really the end, because the pumpkin was connected to fish through a letter he got in the mail.

"The letter was from a high school teacher in Chicago," Ott says, "who had seen my time-lapse pictures on a local TV show." The teacher wanted Ott to

Ott's Prescriptions For Healthy Light

1 Light Bulbs. Ott doesn't believe that artificial light is necessarily bad; it is harmful only if the light does not duplicate the natural spectrum of visible sunlight, and especially if it leaves out ultraviolet. Ott has helped design a fluorescent light that does give off the natural spectrum. It is called Spectralite, and it includes a separate blacklight (ultraviolet) tube and lead radiation shields. It can be ordered from Garcy Lighting, 1822 N. Spaulding Avenue, Chicago, Illinois 60647.

There are at least two other full-spectrum fluorescent lights. One is Duro-Test's "Vitalite," which does give off ultraviolet but is not so economical as Spectralite, according to Ott. Another is General Electric's "Chroma 50," which is the full-spectrum fluorescent used in Spectralite, but without ultraviolet. "Chroma 50" is widely available. Neither of these provides shieldings to block off the radiation at the ends of the fluorescent tubes. But they are somewhat better than regular fluorescent lights.

For incandescent lighting, Ott suggests the "daylight" incandescent bulb, sometimes called "daylight blue." It looks dark blue on the shelf and has a slightly bluish tint when lit. The major manufacturers supply them, so if you look around you should be able to find some. Daylight incandescent does not overemphasize the wavelengths in the harmful red range of the spectrum. Ott says the bulbs to avoid are the "soft pink" ones.

2 Eyeglasses and Contact Lenses. Ott does not believe it is a good idea to wear sunglasses of any kind. He also says that regular eyeglasses block out some of the important wavelengths. You can buy full-spectrum plastic spectacle lenses from the Armorlite Company, 130 N. Bingham Drive, San Marcos, California 92069. These lenses are also available through local eyeglass distributors.

If you wear contact lenses, Ott suggests the full-spectrum plastic contacts made by Wesley Jessen, Inc., 37 S. Wabash, Chicago, Illinois 60603. These can be ordered through an optician. If you don't want to go to the trouble of getting the special plastic contacts, then try to wear the neutral gray contacts (not to be confused with photogray or any other gray lenses). They reduce all the wavelenths evenly and don't overemphasize any particular part of the spectrum.

3 TV. Television sets still give off harmful amounts of radiation, according to Ott. A greater amount may be released from the back of the set than from the front. Try not to place much-used TV sets with their backs to walls that have a bedroom on the other side, since radiation can penetrate walls.

When you are watching, stay as far away from the screen as possible. Better still, read a book.

Ott says black-and-white sets can produce as much harmful radiation as color sets. It depends on the particular set you have. Among the television sets he tested in the Sarasota area, Ott found that a small portable black-and-white gave off as much radiation as all of the large color sets.

4 Light Awareness. Malillumination will increase, says Ott, as more people turn to fluorescent lighting, which they will do because fluorescents are energy-savers. The effects of malillumination can be limited if people buy the right kinds of bulbs, and also if they get into the sunlight as much as possible. The sunlight is most beneficial if you don't wear glasses. And remember that you don't have to look directly at the sun to get the beneficial wavelengths.

More of Ott's ideas on light can be found in his book, *Health and Light*, published by Pocket Books in 1976.

film the spawning of fish in an aquarium. Ott set up the cameras and his fluorescents, never expecting that at least 80 per cent of the offspring in the tank lit with the pink fluorescent lights would turn out to be females. This result reinforced his suspicion that specific wavelengths had something to do with sex characteristics. Ott had another hint.

He didn't have to wait very long to climb even higher up the evolutionary ladder, because another research opportunity arrived in the mail. It was from a chinchilla breeder in New Jersey who had read about the fish in a newspaper. "Her chinchillas weren't producing any female offspring," Ott says, "and I suggested that she change the light bulbs in the pens. I sent her a daylight incandescent that duplicated most of the visible sunlight spectrum." Later, the woman couldn't thank Ott enough for the arrival of three female baby chinchillas.

Even with such suggestive results, Ott had no exclusive interest in pumpkins, chinchillas, or light and gender. By the 1950s, a 20-year string of photographic assignments had led Ott to ponder many mysteries. Some of them began to make sense to him after he got to look inside the cells of a blade of grass. What he saw there led him to rabbits' eyes, arthritis, Cree Indians, rats and cancer.

Ott had been hired to do a photographic record of the movement of chloroplasts inside the cell of a blade of grass. (In addition to everything else, he had also developed the technique of microscopic time-lapse photography, an invaluable research tool.) As usual, Ott wasn't looking for anything special in these grass cells, but he couldn't help noticing. He explained what happened in his book, *Health and Light*, published by Pocket Books in 1976:

"When the *Elodea* grass was exposed to the full spectrum of all the wavelengths of natural sunlight, all the chloroplasts would stream in an orderly fashion around and around from one end of the cell to another. However, if the sunlight was filtered through ordinary window glass that blocked most of the ultraviolet, or if an ordinary incandescent microscope light, which is lacking in the ultraviolet part of the spectrum, was used, some of the chloroplasts would drop out of the streaming pattern and remain immobile near the center or off in one corner of the cell of a leaf. When a red filter was placed in the light source of the microscope, further restricting the wavelengths, more of the chloroplasts would drop out of the streaming pattern, and other chloroplasts would make a shortcut from one end across the center of the cell, without going all the way to the other end."

Ott found that a blue filter would interrupt the normal traffic pattern and cause the chloroplasts to bunch up in a corner like so many autistic children. If the red filter was left in for any length of time, the chloroplasts would mass and attack the walls of the cell, bursting through and eventually killing the cell itself. Ott shows me pictures of these chloroplasts in a movie. The picture of a cell committing suicide under a red light is as gory as anything out of *The Texas Chain Saw Massacre*. "I can kill cells with colors," Ott says.

When the filters were removed and a source of ultraviolet light added to the microscope light, the chloroplasts would again resume a normal pattern. It was Ott's first inkling that ultraviolet light might have something to do with health. He wanted to know more.

The Rabbit's Eye

In trying to make sense out of the *Elodea* grass episode, Ott remembered a film he had once made for some tomato growers. The tomatoes in question were suffering from a very tough virus, and they had been grown in a glass greenhouse. The virus had disappeared when Ott brought the plants into his special plastic greenhouse, in which he took a lot of his pictures. The plastic allowed almost the full spectrum of light to shine through, while glass did not. Ott thought about the mysterious cure, and it occurred to him that maybe viruses are helped along by the kind of cellular chaos he saw in the grass, a chaos brought on by an improper mix of wavelengths.

He dropped another hint. "In what little I have read about viruses, no consideration has been given the possibility of a virus originating within the living cells of a plant itself. It seems to be generally accepted that the virus must be introduced from an outside source. It seems quite possible that a chemical substance of a poisonous nature could result as a by-product from an incomplete and unbalanced metabolism within the cells of a leaf."

Ott was talking about viruses and plants, but not for long. After the movie is over and Ott turns off the projector, he tells me about another social accident, the one that carried him from the grass cell to the rabbit's eye.

This time it wasn't a letter; it was a meeting at a Florida garden club. Ott was showing some time-lapse pictures, at the behest of his aunt, to entertain a crowd on "men's night." An ophthalmologist named Thomas Dickinson happened to be in the audience. He was fascinated with microscopic time-lapse as a research tool. He had been studying the toxicity of various drugs by watching what those drugs did to a layer of cells, the pigment epithelial, in a rabbit's eye. He asked Ott to photograph the reactions.

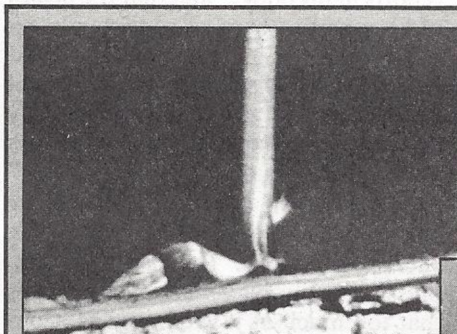
The findings, predictably, were incredible. Neither Ott nor Dickinson would have dreamed that the cells in the rabbit's eye, cells that had no known visual function, would respond to light the same way the grass cells did. But as he was changing the filters in the microscope light source to get better pictures, Ott couldn't help noticing. The granules inside the cells were moving just like the chloroplasts—bunching up under the blue light, taking cellular short cuts under the red and creating general microscopic havoc. Natural light would bring the granules back into a normal flow pattern. Ott approached Dickinson with a very strange conclusion. The strong drugs didn't do that much to the cells, but the color of light in the microscope did.

This chance assignment became the key piece in Ott's light puzzle. It was already known that certain animals respond to light as a signal for behavior, and that egg production in chickens can be increased if the short daylight hours of winter are lengthened using artificial lights. Two scientists named Jacques Benoit and Ivan Assenmacher had studied ducks in France. They concluded that different wavelengths reaching the eye did affect nerve impulses, the brain and the glandular system. And in 1964, Richard Wurtman, Julius Axelrod and Josef E. Fisher, doing research for the National Institute of Mental Health, declared that cells in the retina had a definite connection to the functioning of the pineal glands in rats.

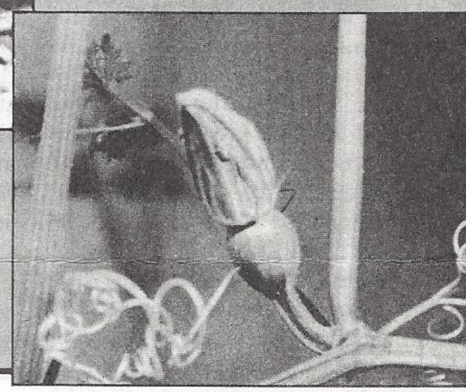
But nobody had said which part of the eye was the receptor for these wavelength signals. Ott thought he had stumbled onto it. The pigment epithelial. He and Dr. Irving H. Leopold, then head of the Wills Eye Hospital and Research Institute in Philadelphia and also the editor of a scientific journal called *Survey of Ophthalmology*, wanted to publish an article.

That was in 1964. "We wrote the article and submitted it to the editorial board," Ott says. "They said they couldn't publish it because ophthalmologists were only interested in vision, and we were talking about retinal cells that had no seeing function."

Ott faced a scientific logjam. The ophthalmologists knew a lot about the interaction between light and the eye, but



Before: Left: *under ordinary "cool white" fluorescent lights, these female pumpkin flowers turned yellow, then black; withered, and finally dropped off the vine.*



After: Right: *but under "daylight white" fluorescent tubes, the same pumpkin vine grew vigorous and fertile female flowers.*

they only wanted to discuss the optical system. The endocrinologists studied the pituitary as part of the glandular system, and they weren't that interested in the eye. Since Ott belonged to neither camp, his discovery fell between the disciplines.

By this time, Ott wanted to know if wavelengths had the same effect on humans that they apparently had on rabbits and rats. In the absence of outside support, he was not afraid to introduce his own personal experience as scientific evidence.

For several years he had had a severe case of arthritis, which gave him pain and forced him to use a cane. During a visit to Florida in the early 1960s, Ott broke his glasses; the combination of this accident and his arthritis turned out to be fortuitous. Telling me about it, he motions outside, through the special light-transmitting picture window, to the part of the beach where the cure had taken place. In 1964, after he broke his glasses, Ott spent a great deal of time on the beach with nothing between his eyes and the healthy wavelengths. His arthritis began to clear up as if by magic. He found that he could run up the stairs. He could also get along without the injections of glandular extracts he had customarily taken to ease his aching joints.

Didn't his recovery imply that his glandular system had been somehow stimulated to produce its own natural lubricants? Could it be that the loss of his light-distorting glasses enabled the proper wavelengths to reach his eye, which in turn stimulated the pituitary to do its job?

In bringing his own miraculous recovery into the picture, Ott began to sound like a witness to Our Lady of Light. His research had already caromed off the science wings of a major university; now he was expanding into the liberal arts and maybe even faith healing. It didn't matter. Evidence was evidence, and Ott was convinced that the basis for health lay somewhere in the ultraviolet wavelengths, the ones that made the grass-blade chloroplasts get back to normal. He knew that most eyeglasses did not permit the passage of ultraviolet, and most of the fluorescent tubes and incandescent bulbs on the market did not give off ultraviolet. He was beginning to see health and light everywhere, and he took that to mean that he was onto something big.

This time, Ott got his corroborating evidence from a Chicago restaurant where he happened to be eating lunch. The place was heavily blacklighted to give a deep-sea effect, and blacklight contains a substantial amount of ultraviolet. Ott inquired about the general health of the waiters and busboys. One of the managers told him that the lights had been in use for 18 years. "He said that the ultraviolet lights had been in use continually during that time," Ott reports in his book, "and that the health of his men had been so consistently excellent that the manager of the hotel had checked into the situation, with medical supervision, to try to determine why this particular group of men was always on the job, even during flu epidemics."

Here was Ott again, making science from luncheon dates and contradicting cherished notions. The prevailing impression of ultraviolet among doctors is that too much of it is dangerous. Constant exposure to ultraviolet can cause skin cancer. The ultraviolet wavelengths are also blamed for an eye disease called pterygium, found among American servicemen stationed in various parts of the tropics.

Ott agrees that too much ultraviolet can be dangerous, but he also believes that too little may also be unhealthy. He attacked the pterygium argument by somehow finding out that a certain group of Cree Indians in northern Canada also suffered from a high incidence of pterygium. If that disease was in fact caused by the ultraviolet from too much intense sunlight, why would you find it in the Canadian North? Ott, naturally, had his own idea. It turns out that those Cree Indians had been issued some special wraparound sunglasses, which they liked to wear all the time. Sunglasses of this type do not admit any ultraviolet rays. If the people who contracted pterygium in the tropical regions also wore sunglasses, then maybe, Ott reasoned, the disease was caused not by too much ultraviolet but by a *lack* of it.

Ott's curiosity about ultraviolet rays was to be aroused again at luncheon. This time, he happened to be seated at a banquet next to Albert Schweitzer's daughter. She told him of a tribe on Africa's west coast who rarely or never contracted cancer until they began to make repeated contact with the outside world. Ott asked if that contact had resulted in the tribesmen's wearing sunglasses. She thought she had run into a scientific Sherlock Holmes. Not only did they wear sunglasses, she told Ott, but sunglasses had become a tribal symbol with the people!

The Hintdropper Transcendent

By the middle of the 1960s, Ott was convinced that he had found the part of the eye that receives messages from light and transmits them to the pituitary, and also that he had found the part of the spectrum that contributes to human health. He had dropped hints, but few people had picked up on them. In 1966, he decided to do some research himself.

A friend of Ott's, Dr. Samuel Gabby, had already gotten some interesting results with mice and light. Gabby put a cancer-prone variety of mice, called C3H, under different types of natural and artificial lighting. The life span of the mice seemed to increase or decrease with different types of lights. Ott did similar experiments in his Sarasota lab. Of the more than 500 mice living under natural light, under ultraviolet-transmitting plastic or under quartz glass, only 15 did not reach maturity. Mice that were raised under various types of fluorescents developed more fatal tumors, and the pink fluorescents turned out to be the deadliest. Only 61 per cent of the mice raised under the pink lights lived through a normal life span. The mice were confirming everything Ott had gathered from restaurants, casual conversations and flights of fancy.

By relying on mice to carry his theory, Ott finally got some response from the scientific community. Ideas that were once deemed worthy of *Mad* magazine began to appear in serious academic journals. Ott published an important series of articles in the journal *Eye, Ear, Nose, and Throat* in 1974. His ideas also appeared in the *Journal of Learning Disabilities*, *Illuminating Engineering* and the *Journal of the American Society for Preventive Dentistry*. He pulls a pile of such journals out of his library-closet as supporting evidence.

The latest returns, from the chinchilla breeders and from the cancer clinics, seem to support Ott's contention that all parts of his theory have validity. Ott reports the corroborative findings: Gabby did his mice studies in 1959. In 1963, Dr. Edward Scanlon, formerly chief of cancer research at Evanston Hospital in Illinois, did a similar study with hamsters injected with tumor transplants. He wrote: "The animals remaining under the cool-white fluorescent tubes showed an average life span of 29 days, whereas those kept under an air curtain (outside conditions) averaged 43 days."

In 1973, some scientists at the Wills Eye Hospital duplicated Ott's own experiments with the C3H strain of mice. Their observations "suggest that cathode-shielded, full-spectrum fluorescent lighting may be an important environmental factor in slowing down tumor development." And in 1974, a further study done by scientists at the Bureau of Radiological Health in Rockville, Maryland, concluded: "There are many unanswered questions in this field. However, one very pertinent point clearly emerges from the studies given here. Specific wavelengths of light affect the incidence and severity of tumors in experimental animals, and they may have an effect on tumors in humans."

Meanwhile, the chinchilla breeders have done further experiments, and they say that the blue part of the spectrum definitely has a determining effect on the sex of chinchilla offspring. (Nobody has tried this one on humans.) The dental people, or at least some of them, believe that Ott's ideas also have application to tooth decay: certain fluorescents may cause a higher incidence of decay among children. And Ott's research results are so generally intriguing that the Roswell Park cancer center, part of the State University of New York, has been conducting its own research to investigate some of his ideas.

In the last couple of years, with other people finally following up on the old hints, Ott could not resist sending out a few new ones. There was the time-lapse experiment with hyperactive children in a Sarasota classroom. Ott installed his full-spectrum fluorescent lighting, with special shields to block off the radiation (which he presumes harmful), and turned on his cameras for 180 days. After 60 days, the collective movement of the children had slowed down considerably, and the teacher had noticed a marked improvement in classroom behavior and attentiveness.

The lighting industry was terrified enough to try to duplicate the experiment on Long Island. General Electric announced the results: changing the lights from regular fluorescents to full-spectrum fluorescents had no effect on hyperactivity. Ott countered by pointing out that GE observed children for only five days, whereas it had taken 60 days before he got results in Sarasota.

Ott is gratified by his new-found acceptance in professional circles, but he is not satisfied. The next step is in practical application. Mice are one thing, humans another, and very few people have applied Ott's ideas to lighting systems. Even in Sarasota, the school did not have the funding to permanently change the lighting in the classrooms.

The phone seems to ring all the time at Ott's home. One of the calls he received while I was there came from a cancer specialist. He was wondering why all the research outfits were getting such differing results from tests of the controversial drug Laetrile. The Laetrile issue has divided cancer research into hostile camps, and there is talk of fraud and experiment-rigging. Ott, of course, has a less accusatory answer to why people are getting different experimental results: you always get conflicting results if the lighting isn't the same.

Regardless of whether this is another of Ott's intuitive triumphs, it is certainly another lead. From all the bits and pieces, Ott has created an entirely new science. If his theory is right, hospitals will have to be lighted with the same care as they are sanitized. (Ott says most hospitals use one of the worst fluorescents, in an attempt to give a healthy look to skin.) Laboratories will have to consider lighting in setting up standardized experiments. Doctors and drug manufacturers will have to worry not just about the interaction of the drugs and the foods we eat, but also about the light we take in through our eyes. Regular people will have to put ultraviolet on their list of healthy substances, and they will have to pay attention to what they see as well as to what they eat.

Ott's career is a statement on seeing that goes beyond the pigment epithelial and the pituitary. His successes challenge scientific method as well as scientific fact. In this time of fat research grants and the onward march of advanced degrees, his life is a reminder that transcendent ideas can come from a quantum drifter and confirmed hint-dropper with no more scientific training than a belief in what appears in front of his own two eyes.

John Rothchild lives in Florida. He last wrote for Mother Jones *about an Appalachian skills-trading co-op (April '78).*

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