



First Annual  
Scientific Meeting

*Opening Session*



Van Wezel Performing Arts Hall  
Sarasota, Florida

Sunday, June 10, 1973  
8:00 P.M.

## CHARTER OFFICERS

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RICHARD J. BURK, JR.

American Society for Photobiology

4211 39th Street, N. W.

Washington, D. C. 20016

8:00 P.M.  
to  
8:30 P.M.

SPEAKERS

KENDRIC C. SMITH

President American Society for  
Photobiology

ALAN D. CONGER

Past President Radiation Research  
Society

LUIZ R. CALDAS

Member Executive Committee of  
Comité International de Photobiologie

RAY JENSEN

Manager Biological Programs,  
Climatic Impact Assessment Program  
of the Department of Transportation

HONORABLE PAUL G. ROGERS, M.C.

Chairman Subcommittee, Public Health  
and Environment

8:30 P.M. to 9:00 P.M.

STUDYING PHOTOBIOLOGY WITH  
TIME-LAPSE PHOTOGRAPHY

JOHN OTT

SARASOTA ARRANGEMENTS COMMITTEE

JOHN NASH OTT, *Chairman*

PHILIP L. SALVATORI

HOWARD WILLIAMS

WOMENS' COMMITTEE

MRS. SCOTT APPLEBY, *Chairman*

MRS. JOHN G. ALLBRIGHT

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MRS. KENT MCKINLEY

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MRS. JOHN OTT

MRS. H. B. VAN CLEVE

MRS. NORMAN WAITE

MRS. S. A. WELSH

MRS. E. K. WILD



—Staff Photo by Barney Stein

*Society For Photobiology Speakers*  
... Rep. Rogers, President Smith and Sarasotan Ott



# Photobiology Unit Discusses Effects Of Polluted Light

By JEFF SMITH

Herald-Tribune Staff Writer

"The biological effects of light have for too long been ignored by the scientific community and the public," said Dr. Kendric C. Smith, and the first annual meeting of the newly formed American Society for Photobiology had begun.

In Sarasota for their first meeting at the invitation of Sarasotan John Ott, the 200 new delegates "joined together" Sunday night to hear U.S. Rep. Paul G. Rogers of Florida; among other speakers, agree the "effects of polluted light have been overlooked."

"We've walled ourselves in behind glass and live under artificial light, drastically changing our environment," said Rogers, chairman of the House subcommittee on Public Health and Environment.

Only recently, explained Dr. Smith, of the Stanford Medical Center, have dramatic effects of such changes been given attention. The Society for Photobiology, or group of medical researchers, chemists, and physicists working on the biological effects of light, has been formed to correct that situation.

Throughout the week, the Society will be meeting in Sarasota to "call attention to the effects of light as related to national problems, and educate others — even within our own discipline — of the importance of light and its biological effects," Smith explained.

Sarasota was chosen for the "historic meeting" at the behest of Dr. John Ott, whose work in time-lapse photography has been valuable to photobiological studies and even to legislation already enacted as a result of studies.

# Light Pollution A New Concern, Legislator Tells Meeting

By DOROTHY STOCKBRIDGE  
Journal Staff Writer

Light pollution, a new concern, was among the challenges Rep. Paul G. Rogers of West Palm Beach offered up to the American Society for Photobiology holding its first annual scientific meeting in Sarasota.

"We've walled ourselves in behind glass and live under artificial light, drastically

changing our environment," noted Rogers, chairman of the House subcommittee on public health and environment. "Many life responses are found to respond to a delicate balance of light waves. It's the responsibility of government to establish proper safeguards to insure against a polluted spectrum."

Rogers credited the Sarasota host to the Photo-

biology group, Dr. John Ott, with pointing out the harmful effects of television radiation on plants and laboratory mice.

"As a result of research done right here in Sarasota we were able to sponsor the Radiation Health and Safety Act of 1968," said Rogers. "We need to look at those standards again to see if the levels are low enough. I think

we'll find them too high."

Rogers pointed out the historic significance of the first meeting, noting that by correlating research through a photobiology group more attention can be focused on important finds.

"I hope that photobiology will be recognized as much as anything in medical research. The nation needs your service," Rogers concluded.

Dr. Kenrick C. Smith of Stanford Medical Center, president of the new photobiology group, said that people are becoming more aware of the effects of photobiology — the phenomena of ultra violet, visible and infra-red light.

Focusing attention on the field is the use of light therapy in treating congenital jaundice in premature babies, replacing the total body blood transfusions that had been necessary.

A question as to whether the supersonic transport exhausts would destroy the ozone layer in the atmosphere, letting through more ultra violet light, has also turned attention to biological effects of upsetting advance.

A third implication that's making medical men sit up and take notice is the use of photobiological techniques in treating the common cold

(Continued From Page 1A)

sore. The same techniques are being used to treat tumors in experimental animals.

Dr. Smith, elated that more than 200 members of the 600-member group have already arrived for the scientific sessions at the Lido Biltmore, believes the group can be far reaching. It has already attracted delegates from England, Belgium, Holland and Brazil.

"Photobiologists from all disciplines finally have a meeting ground and a national focus on the science.

"I hope we can educate scientists and lay people about the biological impact of light," said Dr. Smith whose own specialty at Stanford is studying the damaging effects of ultra violet light and the mechanism the cells have for repairing this damage.

He's also hopeful that more research grants will be forthcoming as the photobiologists can show the relevance to the needs of man.

Dr. Smith doesn't like the term light pollution but acknowledged that lack of parts of the light spectrum can indeed effect behavior and growth in plants and animals, as illustrated in the time lapse photographs shown at the opening session Sunday night at Van Wezel Hall.

Dr. Ott's latest project is filming the hyperactivity of a classroom at Gocio Elementary School under fluorescent lighting which is standard in almost all classrooms in the county. When the ends of the fluorescent tubes were shielded with lead, the youngsters in his pictures showed a marked improvement within 90 days.

The School Board is scheduled to view the films July 3.

Previous time-lapse work by Ott indicated that different kinds of artificial light could upset the normal process of photosynthesis. These discoveries led to curiosity as to what happened to animals.

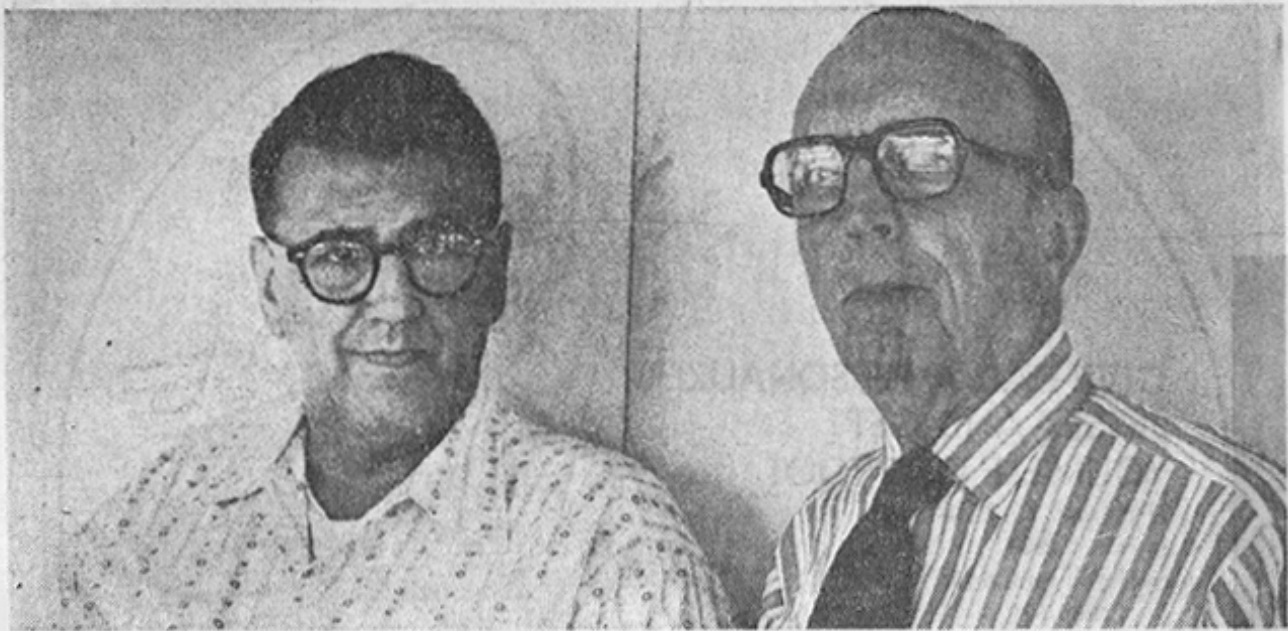
Under ordinary incandescent light, chinchillas produced almost all male offspring; under bluish, almost all female which are considered more valuable. Today chinchilla breeders (and now horse breeders) use lights recommended by Ott and obtain up to 85 per cent control on the sex in litters. Ott's findings have pointed to the fact that cutting down the ultra-violet part of the spectrum by window glass or eyeglasses can be harmful to the health.

Laboratory animals living under artificial light lacking part of the spectrum have developed tumors more quickly than control groups.

"I may be raising more questions than answering," Ott told his audience.

Finding the answers is the challenge of the photobiology group.

(Continued on Page 2A, Col. 3)



—Journal Staff Photo By Dorothy Stockbridge

### Dr. Frederick Urbach And Faber Birren

... presented papers at photobiology sessions here

By DOROTHY STOCKBRIDGE  
Journal Staff Writer

Mad dogs and Englishmen go out in the noon-day sun.

And so do people who risk skin cancer, according to Dr. Frederick Urbach, dermatologist and Temple University researcher.

He'd like to see Americans adopt the siesta of the Latins living near the equator who know better than to venture out when the rays of the sun are at their highest.

"Stay out of the sun from 10 until 2 (that's 11 to 3 o'clock DLS)," said Dr. Urbach, in Sarasota for the first scientific meeting of the American Society for Photobiology.

He said that skin cancer accounts for one-third of all cancer in the United States — some 300,000 new skin cancer cases every year. Mostly it's curable and only 4-5,000 of this number will die from the disease.

"It's almost entirely preventable," lamented Dr. Urbach, who is lucky to have the kind of skin that tans easily, protecting him from the burn and blister that causes the trouble. He said that 60 to 70 per cent of the ultraviolet rays that produce the burn and delayed skin changes including cancer penetrate during the four hour period around noon.

Skin cancer among Caucasians is on the increase throughout the world because of increased leisure patterns, he said.

"Before World War II it was fashionable to be pale. The poor who worked outdoors had the tans," he said. "Now it's a status symbol to have a tan. It proves you have enough money to be out on the golf course or on the beach."

Evidence is building up that skin cancer and premalignant skin lesions, not to mention wrinkles and aging skin, are caused by prolonged sunlight exposure. Blacks and other dark-skinned people escape this hazard, which is why a 70-year-old black appears ageless. His skin has been protected.

A girl who's been deeply tanned for 10 years will look older than a girl of the same age who has been more careful of the sun, said Dr. Urbach. He calls sunlight one of the great pleasures of life but only a few minutes of exposure will provide the Vitamin D the body needs.

Even with the best suntan lotion, modern man still must practice moderation or risk long-range harm. Genetic factors, related to the capacity of the skin to tan, are also important. In redheads or people of Irish, Scot or Welch extraction, the

cells that form the pigment don't operate normally and these people are six to eight times as likely to get skin cancer.

"Fair-skinned people have no business being in the direct sun," cautioned Dr. Urbach.

Skin cancers usually develop on the nose, lower lip, cheekbones, hands and the top of men's ears. "My sons say their long hair protects the top of the ear and the back of the neck and they're right."

He pointed out that an overcast day or being in the shade offer little protection from ultraviolet rays that can burn while the person feels cool. Since sand, like snow, is an excellent reflector, a person sitting under a beach umbrella is getting a full dose of harsh sun, half from the sky and half from the sand.

Besides observing siesta time, Dr. Urbach suggests large hats, veils or the protective scarf of the French Foreign Legion. Or coming back to Philadelphia with him.

**Siestas  
Can Help  
Avoid  
Cancer**



## Color Adds To Mental Attitude

By DOROTHY STOCKBRIDGE  
Journal Staff Writer

Many offices and factories could cause snow blindness.

"High intensity lights and white walls are awful on the eyes," said Faber Birren, a Stamford, Conn., color consultant, who addressed the American Society for Photobiology in Sarasota this week. "For the best concentration keep the lighting but paint the walls rose."

It's not that he's partial to rose, but he believes that a color environment that's interesting and attractive makes for factory safety and relieves eye fatigue.

He has learned that colorfully decorated hospitals can help in the recovery of mental patients.

"Colors can be psychological therapy in drawing the patient's attention out of himself to his environment. A pretty nurse would do the same thing," joked Birren.

Yellow-green and purple would never be used in a hospital, he said, because their after-image adds a pallor to the skin tones.

Variety is good — one room yellow, the next one blue — so that as the patient walks around he has a constant shift in his visual stimulation.

People confined to areas without color stimulation are subject to hallucinations, he related.

Birren was trained as an artist because his father was a painter but said he had no talent along those lines. His interest in color stuck however.

Historically, red is exciting and associated with blood, fire and warmth. Orange and yellow are cheerful and have a stronger impact than cool colors. Green is neutral, like nature, while blues relax and pacify.

Following the findings of photobiologists, Birren believes that artificial lights should have a moderate amount of ultraviolet.

"I'm here as a student. A tremendous amount of this material has practical application to human welfare," he said. "I'm not interested in appearance and aesthetics as much as human reactions."



## Scientist Explains Dangers Of Severe Sun Exposure

By JEFF SMITH  
Herald-Tribune Staff Writer

As most Floridians would agree, "to avoid the sun would be to exist without one of the greatest pleasures in life." Many Floridians may not realize, though, that individual susceptibility to the sun can be affected by such things as hobbies, occupation, habits, genetic background, and total lifetime sunlight exposure, and that severe exposure will cause "unhappiness and even serious illness."

Those are the conclusions of Dr. Frederick Urbach of the Temple University Health Sciences Center, as related in a symposium Thursday of the Society for Photobiology meeting in Sarasota.

Sunburn, he said is due to "acute overexposure of the shorter wavelengths of ultra-violet radiation in sunlight." The long term effects of such exposure, which may cause the unhappiness and illness, are skin cancer and pre-

malignant and malignant skin tumors. Aging or wrinkling of the skin, in fact, is nothing more than a reaction of the skin to lifetime sunlight or light exposure.

Susceptibility to skin cancer and tumors is affected first by the intensity and duration of the ultra-violet component in the sunlight. Epidemiological studies carried out in Queensland, Australia, and Galway, Ireland, he said, have shown "a highly significant correlation" between skin cancer incidence and great lifetime sunlight exposure.

This relationship is in part due to cumulative dose, but, Urbach stated, it also depends on the duration of high intensity exposure each year — which is where habits, occupation, and hobbies come into play.

An additional factor which determines susceptibility to light is heredity, stated Dr. John H. Epstein of the University of California. Per-

sons whose skin genetically lack the capacity to produce melanin (to tan) are more susceptible to the sun.

"Individuals of Celtic origin of light-complexioned individuals fit into this group," says Epstein.

In another category, certain genetically determined amounts of chemicals cause "chemical photosensitization leading to phototoxic damage." A third group delineated by Epstein contains less prevalent genetically-consequent reactions to the sun.

The wave lengths of sunlight which are modulated by the presence of ozone in the stratosphere are those that are "detrimental to biological systems." It is this same wavelength region of light, however, that produces "the essential vitamin in the skin of man: vitamin D," said Urbach. "Thus, the situation is one of balance: sunlight is necessary for life, yet, in excess it is harmful."



—Staff Photo by Jim Townsend

From left to right, Mrs. H. D. Lindsay, Mrs. Stanley Welsh, Mrs. Scott Appelby

## Convention Hostesses

Sightseeing arrangements made for the wives of members attending the first annual meeting of the American Society for Photobiology will include trips to the Ringling Museums, Jungle Gardens, Mote Marine Lab, and a cruise on the Dixie. Hostesses are: Mrs. John G. Albright, Mrs. Scott Appleby, Mrs. Elias Atkins, Mrs. Hurley Bogardus, Mrs. J. W. Curtis, Mrs. Morgan Davies, Mrs. C. L. Evans, Mrs. Wharton Ingram, Mrs. Ernest Johnson, Mrs. H. D. Lindsay, Mrs. Lawrence Marshall, Mrs. Kent McKinley, Mrs. Lawrence Meeker, Mrs. John Ott, Mrs. H. B. VanCleve, Mrs. Norman Waite, Mrs. S. A. Welsh, and Mrs. E. K. Wild.







—Journal Staff Photo By Dorothy Stockbridge

*Therese Cotton, Mayfair Kung and Jennifer Culbert*

*... doctorate students in bio-chemistry at Northwestern*

## Color Role In Nature Intrigues Coeds

By DOROTHY STOCKBRIDGE  
Journal Staff Writer

Photophosphorylation and redox potential don't perplex a trio of pretty coeds from the Northwestern University.

The girls, doctorate students in bio-chemistry, are among the few women at the first annual scientific meeting of the American Society for Photobiology, taking place through Thursday on Lido Beach.

In fact, petite Jennifer Culbert is presenting a paper on the dependency on environmental redox potential of bacterial photophosphorylation in *rhodospseudomonas spheroides*. If you have a couple of hours, she'll patiently explain that that has something to do with how light excites bacteria.

The girls are pretty excited themselves about being in Sarasota for the meeting.

"But when you go to all the meetings, it's work," frowned Jennifer who was trying to figure when she was going to put some of that sunlight the scientists have been studying to work on her tan. Shopping on the circle and eating some Florida seafood were also on the minds of her fellow students, Therese Cotton and Hong Kong born Mayfair Kung.

Mrs. Kung is married to a doctoral candidate

in bio-chemistry and Jennifer is engaged to one, which Jennifer figures will help along the marital bliss.

"This kind of mental work is exhausting," Jennifer pointed out.

Mrs. Cotton, who's married to an engineer, has had a few interruptions in her schooling — four of them when her children, now 13, 10, 7 and 3 months, were born.

While the girls admit they are decidedly in the minority at the scientific meeting, they said that girls make up about half the bio-chemistry students at Northwestern — a much higher percentage than in any of the other chemical fields.

"The Ultraviolet world of insects" was the topic packing them into the Lido Biltmore dining room Monday afternoon. Timothy H. Goldsmith of Yale University was explaining that vision for many insects extends into the ultraviolet region which is a distinct color. Because near UV light is the most effective in attracting insects, insect traps are fitted with UV lamps. Conversely, because lamps that are poor in blue and UV light offer much less stimulation to insects, yellow bulbs are used to light porches and patios. Flower colors frequently involve patterns of differential UV light reflectance that flag prospective mates. (It only works with but-

can be appreciated by insect pollinators but not by the unaided human eye. Butterfly wings also contain patches of high UV reflectance which terflies, girls) Many insects navigate by the polarization patterns of natural sky light, involving near UV and violet light.

One of today's featured symposia focuses on the role of light in the human environment. Visible light, as much as ultraviolet or infrared radiation, has the ability to exert measurable biologic effects. A new appreciation of this fact has been stimulated by the use of light therapy in treating premature babies with jaundice. Fluorescence microscopy and spectrophotometry are now becoming widely used as aids in the diagnosis of disease. By using light in combination with photosensitizing dyes, viruses that produce disease such as cold sores in humans and malignant tumors in experimental animals are caused to regress.

Studies of the effects of constant dark or light environment and light of differing spectral distributions have shown effects on organ size, growth patterns and sexual maturation in some animal species.

The psychological effects of light, particularly of colors, are well known but not well under-

stood. Light intensity as well as wavelength may alter productivity and mood. The penetrance of visible light rays into tissues deeper than the skin has not been adequately measured. Investigations have demonstrated a significant transmission of blue light through the entire abdominal wall of the rat. Light is perceived by structures other than the eyes in many

animals. Pinpointing these photoreceptors presents a challenge to the ingenuity of photobiologists.

The types and sources of artificial light, intensities, spectral characteristics and the chemical, physiological and psychological effects on man present enough problems to keep photobiologists busy for many more scientific sessions.

## Color Role In Nature (continued)

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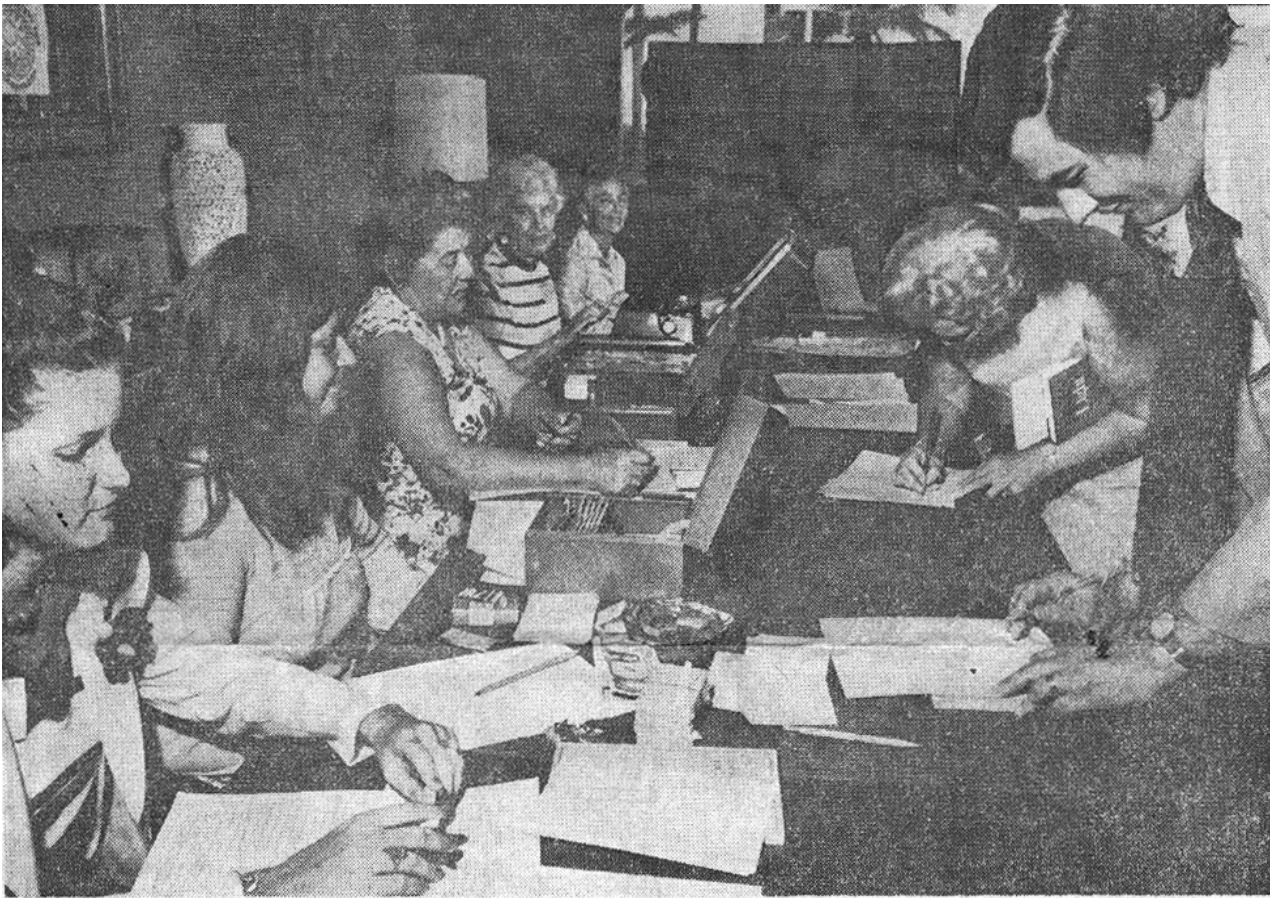
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—Journal Staff Photo By Ken Torrington

**PHOTOBIOLOGY MEET** — W. Dean Rupp, right, of the Yale University School of Medicine, and Alice F. Stevenson of Ft. Myers check in for the first annual scientific meeting of the American Soc-

iety for Photobiology being held on Lido Beach. Helping with registration, from left, are Joann DeLuca, Barbara Coberly, Emma Walsh, Celia Terry and Mrs. Sally Appleby.







# Body Chemistry Influenced

## By Light

By JANE SHEETS

Herald-Tribune Staff Writer

"I believe we need to know much more about natural and artificial light and what it does to us and to the plants and animals sharing our world. Modern technology has made our old ideas about light obsolete," said Dr. John N. Ott.

Ott is the head of the Environmental Health and Light Research Institute which this week will welcome members of the American Society of Photobiology at the first annual meeting. The opening session will be held Sunday at 8 p.m. in the Van Wezel Performing Arts Hall.

Ott, who retired from a banking career in 1927, has been devoting full time to his hobby — photography. He became intensely interested in time-lapse pictures and so expert in this technique, that he participated in and originated work done as a number of Disney films and other motion pictures. One of the most notable films was "On A Clear Day," starring Barbra Streisand.

"I had noticed," said Ott, "the way light affected blossoms and plants in time-lapse work, and in experiments I had made on sex determination in fish and litters of chinchillas. Enough was learned to serve as a

basis for further experiments with horses, and the results so far indicate that the same responses will be obtained with these larger animals.

"Light enters through the eye, which stimulates the pituitary gland, which is the master balance wheel of the entire glandular system.

"If the entire glandular system can be affected by light received through the eye, the resulting consequences and possibilities of what this might mean are utterly fantastic. Different types of light and lighting conditions from natural unfiltered sunlight to artificial light could affect the physical well-being of an individual."

Ott has just completed some fascinating films dealing with fluorescent lighting in classrooms. For the past few months he has been taking pictures at Gocio Elementary School and these films will be shown at the Van Wezel on Sunday.

In the first group of pictures, primary graders were working under standard schoolroom fluorescent lighting. Most of the youngsters were fidgety, distractable and paid little attention to classroom procedure.

Then after leaded shields were added to the lighting, he again took a series of films at intervals of slightly less than two months and then slightly less than three months. The results were al-

most unbelievable. One little boy who stood out in the first films because of his constant motion and who was inattentive to everything, even his own head-banging, had changed to a quieter child, able to sit still, able to concentrate on routines, and, according to the teacher, had even learned to read in that short period of time.

Ott is also greatly interested in the effects of TV radiation. In one experiment with rats, two were placed in a cage, protected from TV radiation by only a sheet of black paper. A second pair had lead shielding from the radiation. The first couple fought and ran ceaselessly — the second pair were normally placid and seemed content in their surroundings.

"A safety standard of .5 mrh was set up by the 1968 Radiation Control Act," stated Ott, "this newest level is the ninth time since the discovery of X-ray in 1895 that lower "safe" levels have been set. And we have now discovered that even .3 milliroentgens of radiation are too much and adversely affect children."

Perry A. Sperber, MD., in a report appearing in the May issue of the Journal of the Florida Medical Association states:

"The pineal gland obviously

relays data concerning early light wave cycles, color information, and artificial light sources. Changes in daily light reception by the brain may be responsible for seasonal changes seen in humans which produce spring fever, ulcers, psychoses, and suicides."

Speakers for the opening session on Sunday will be: Dr. Kendrick C. Smith, president American Society for Photobiology; Dr. Alan D. Conger, past president Radiation Research Society; Dr. Luis R. Caldas of Brazil, who is a member of the executive committee and the Comite' International De Photobiologie; Ray Jensen, manager biological programs Climatic Impact Assessment Program of the Department of Transportation; the Hon. Paul G. Rogers, M.C., chairman subcommittee Public Health and Environment; and Dr. John Ott. Tickets will be \$2.50, \$1.50 for students and are available at Ellie's Bookstore, and all the principal optical stores in Sarasota, and the public is invited to attend.

# Cancer Cells Destroyed By Simple Light Bulb

By DOROTHY STOCKBRIDGE  
Journal Staff Writer

Cancer cells in mice have been destroyed by a 150-watt light bulb.

"It's a promising lead but still an experimental approach," cautioned Dr. Ivan Diamond of the University of California in San Francisco.

A neurologist, Dr. Diamond presented the findings of a six-man medical team at the scientific meeting here of the American Society for Photobiology. He was accompanied to the Lido Beach sessions by Dr. Antony F. McDonagh.

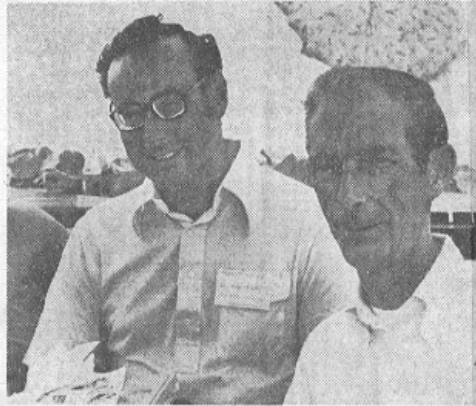
It will be six months to a year before the findings are attempted with selected human patients. Similar research is also progressing at the Roswell Park Institute in Buffalo.

A photosensitizing dye

similar to blood pigment is injected into the cancerous cells and this reacts with the light bulb to destroy the malignant cells. This photodynamic therapy offers

a new approach to the treatment of brain tumors and other neoplasms resistant to existing forms of therapy, the photobiologists were told.

(Continued on Page 2A, Col. 2)



—Journal Staff Photo By Dorothy Stockbridge

**Dr. Diamond And Dr. Sisson**

... in relaxing moment at scientific conference

(Continued From Page 1A)

According to Dr. Diamond, the research was a spinoff of successful phototherapy in treating premature babies with jaundice.

"This illustrates again how it's possible to use the spinoff of unrelated observations,"

said Dr. Diamond, praising the exchange of ideas coming out of the photobiology sessions. "Success depends on having a talent pool to attack problems."

Dr. Thomas Sisson, a Temple University School of Medicine, Md., who has worked with treating jaundiced babies, explored the role of light in human environment during the session.

He said the combination of phototherapy for the jaundice and elevated oxygen for respiratory distresses in the premature babies had possibly caused some retina damage.

"We're particularly concerned with the effect of an artificial lighting environment," he said.

The babies are kept in the always-lighted atmosphere for their first two months. Altering the normal day-night rhythms may also disrupt biological rhythms, Dr. Sisson said.

Visible light, as much as ultra violet or infra red, has the ability to exert measurable biologic effects.

"Only recently have we been concerned with the visible spectrum as it effects humans," he added. "We don't yet know that artificial light is bad compared to natural light."

He too credited the jaundice light therapy with opening up a whole new promise that

light of one kind or another may be therapeutic.

Cold sores, the virus of herpes simplex, can be destroyed when light reacts with a photosensitizing dye applied to the sores. Fluorescent dyes activated in the fetal cells have also permitted the diagnosis of some hereditary disease.

Dr. Sisson also indicated that rhythms of metabolic and biochemical processes, the reproduction of hormones, enzymes, amino acids, are regulated by the cycling of light and dark. Studies of the effects of constant dark or light environment and light of differing spectral distributions have shown effects on organ size, growth patterns and sexual maturation in some animal species, possibly including man. Light intensity as well as wavelength may alter productivity and mood, according to Dr. Sisson.

"It's obvious we must consider the photobiologic consequences of artificial light, intensities, spectral characteristics and the chemical, physiological and psychological effects of the lighting environment in man."



(Staff Photo by Jim Berry)

### Visiting Scientists Take Break From Meeting

Dr. John Nash Ott, Phillip Salvatori, A. L. Marchese, Dr. A. H. Friedman

## Plant Reaction Quickly Seen

By SALLY REMALEY  
Herald Staff Writer

At the first meeting of the American Society for Photo-biology being held in Sarasota, scientists reported that recently - designed equipment allows them to follow reactions which take place within 10 psec after light is absorbed by the chlorophyll of plants. (A psec is one thousandth part of a billionth of a second.)

The reaction followed is the ability of plant cells to remit some of the light energy they absorb and which they cannot use in photosynthesis.

The report by Drs. M. Seibert of the GTE Laboratories in Waltham, Mass. and R. R. Alfano of the Physics Dept. of City College of New York, indicates that it is now possible to study directly the primary and extremely - rapid reactions of photosynthesis involving the absorption of the light energy from the sun.

This energy is expressed many milliseconds later in the plant cell in the form of chemical energy in specific sugars formed from the carbon dioxide in the air and water from the soil.

Dr. C. C. Black of the University of Georgia reported on the different mechanisms by which plants take carbon dioxide from the air to form sugars, which are then converted into other forms of plant food.

The first process discovered

and described in the 1950s by Nobel prize winner Melvin Calvin is the classical "pentose cycle."

Dr. Black described the newly discovered "four carbon cycle" which operates in grasses and sugar cane. This process is much more efficient, since it takes place at low carbon dioxide concentrations and at higher light intensities.

The success of the "four carbon pathway" depends upon an internal compartmentalization of enzymes within the plant cell. With the intense need for increased food production in the

world, any information concerning the natural mechanism plants use to make use of sunlight more efficiently in photo-

synthesis is of great importance in helping scientists plan for increased food production throughout the world.

In all phases of biological and medical research there is intense interest in how the various cell components are organized into the membranes which are so vital to the cell processes.

Photosynthesis is no exception. Although most of the components of the chloroplast membrane are known (the chloroplast is the green factory in the plant cell where sunlight is absorbed by the chlorophyll and photosynthesis takes place), the scientists working in this field do not know how they are put together.



Rod Park and Kendric Smith







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LEITH, SCOTLAND

PRODUCT OF SCOTLAND

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## **Hankey Bannister Scotch Whisky**

is the Blend supplied by us for many years to Officers of Her Majesty's Services, the Diplomatic Corps and markets throughout the world. The distinctive quality of this Whisky lies in generations of expert blending of the finest Scotch Whiskies procurable matured in wood, blended and shipped from Scotland.

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