

Historical Review

Organized Photobiology in the United States: The Prehistory*

Farrington Daniels, Jr.†

Department of Medicine, University of Wisconsin, Madison, WI, USA

INTRODUCTION

In general, photobiology has been strangely neglected by investigators, planners and granting agencies. However, there were individuals and organizations that kept the subject of photobiology going in the absence of groups identified as photobiologists. We will emphasize only a few that can be tied to the history of the American Society for Photobiology (ASP), including mentors of some of the founding members of ASP.

Notable organizations in the United States included the U.S. Department of Agriculture laboratory at Beltsville, MD, the Hopkins Marine Station of Stanford University located at Pacific Grove, CA, the Carnegie Institute Laboratory at Stanford, CA, the Illuminating Engineering Research Institute in New York City coordinating research among utilities and lamp manufacturers, the Photobiology Institute at Brandeis University with Albert Kelner and The Bureau of Standards in Washington, DC. The University of Minnesota had several investigators working on porphyrins and light sensitivity. Harold Blum was a multidisciplinary group by himself, his activities including writing a book on evolution and advising the French government on paleolithic cave art!

The Mayo clinic was a leader in UV therapy, including Goeckerman's combined use of tar and UV light, a process believed by its users to work by some means other than photosensitization. Europe has long had a greater emphasis on physical and "spa" forms of treatment, and the dermatologists who came to the United States as refugees from Hitler brought the knowledge of UV therapy with them. Among these dermatologists were Stephen Rothman at Chicago, Rudolph Baer at New York University and Stephen Epstein at the Marshfield Clinic in Wisconsin. When Marshfield's Epstein first talked about photoallergy he was received with some puzzlement. Rothman (1) is given credit for making American dermatology scientific and influenced many.

C. B. van Niel was an inorganic chemist who became a microbiologist and worked at the Hopkins Marine Station of Stanford University at Pacific Grove, CA. He gave a summer

course for 12 students per year in scientific thinking, which was called microbial biochemistry. He mentored M. Matthews Roth and Farrington Daniels, Jr. in photobiology and probably others. Another Stanford faculty member who influenced many in photobiology was Arthur Giese. In the field of photosynthesis Daniel Arnon was a mentor and also a founding member of the ASP. In vision, Nobelist George Wald at Harvard stood out.

There are probably other individuals and institutions that deserve mention, but the point is that photobiology was carried on thin threads. Photodynamic action was considered just another quaint subject that Harold Blum talked about (2).

Of particular interest for the ASP is Alexander Hollaender, who did his graduate work in physical chemistry at the University of Wisconsin. There he became involved in evaluating the claim that cell divisions give off mitogenic rays. His efforts to calm the excitement included a trip to Russia. The Hollaenders left a legacy at the University of Wisconsin where they were the largest donors to the Art Museum on the campus.

As director of the Biology Division of the Oak Ridge Laboratories Hollaender organized a team of investigators of the biological effects of ionizing and nonionizing radiation and edited a three-volume set of books on radiation biology (3). He began coordinating efforts in US photobiology from Oak Ridge, and then in Washington with the National Academy of Sciences Committee on Photobiology, which is covered in the review in this symposium by Kendric Smith (4).

Dan Berger had written (in a personal communication, 31 October 1995) about the "Loners" group in the Philadelphia area. While primarily a group of persons engaged in medical electronics, they were also concerned with measurement of environmental UV radiation. In the group "any question was valid and no question or questioner could be ignored or demeaned." About a hundred people participated over a 21-year period in the 153 meetings of the group.

In 1982 Kendric Smith in his history of the ASP (5) identified four groups that specifically led to the formation of the ASP and were recognized as precursors by the Photobiology Committee of the National Research Council/National Academy of Sciences. They were the Northern California Photobiology and Photochemistry Group (NCPGP), the Northeast Photobiology Group (NPG), the South Central Photobiology Group (SCPG) and the Photochemistry Photobiology Group (PPG) of the Biophysical Society. A fifth group reviewed here also formed in the 1960s was the informal

*Presented at the American Society for Photobiology in St. Louis, MO, July 1997, as part of the Landmarks in Photobiology Symposium celebrating the 25th Anniversary of the founding of the Society.

†To whom correspondence should be addressed at: 537 Piper Drive, Madison, WI 53711, USA.

© 1997 American Society for Photobiology 0031-8655/97 \$5.00+0.00

“No-name” Group of medical photobiologists and associated Ph.D.

SOURCES OF INFORMATION

These five groups are documented in the Photobiology Archives of the Special Collections of the library of the University of Tennessee. The medical photobiologists became the Photobiology Task Force of the American Academy of Dermatology; the others collapsed after the ASP was formed. The author has relied heavily on the Archives to avoid presenting a totally personal reminiscence.

Unless otherwise identified the quotations in this review are from correspondence in the Photobiology Archives at Tennessee.

To get a better history of the beginnings and the mentors I have written to about 30 of the founding members of the ASP and so far received about 12 replies. Fred Urbach identifies Harold Blum as his principal photobiology mentor. Micheline Mathews-Roth identifies Roger Stanier and C. B. van Niel among her mentors. Govindjee names Robert Emerson and Eugene Rabinowitch. Farrington Daniels, Jr. considers C. B. van Niel and Stephen Rothman as his photobiology mentors. Norman Krinsky lists George Wald as his principal mentor but also indicates influence by several others including Eugene Rabinowitch, James Franck, Roger Stanier and C. B. van Niel.

BRIEF HISTORY OF THE FIVE GROUPS

The photobiology groups that were formed in the 1960s had several things in common:

1. They were interdisciplinary, interinstitutional and interested in the biological effects of “non-ionizing radiation from 100 to a little over 1000 nanometers,” and an “intensity range from a single photon to irradiances producing thermal as well as photochemical effects.” While informality in presentation was stressed, there had to be enough organization to send out letters for a gathering at a host institution; the presentations and presenters were chosen by the host institution.

2. They were very definitely aimed at interdisciplinary communication, which went so far as to be described as cross-fertilization.

3. They were started on financial shoe strings that provided mailings from a hard-working secretary who could arouse enthusiasm with witty letters.

4. They eschewed formal presentation of publishable papers. A frequent format was one formal lecture followed by short informal talks that led into group discussion.

A contribution of the mother country should be noted. There is a letter from S. Y. Thompson of the National Institute for Research in Dairying in Sheffield, England to Kendrick Smith at Stanford stating that: “The British Photobiology Group was founded in October, 1955 for the purpose of bringing together biologists, chemists and physicists with an interest in this field, to further scientific discussion in this country and to cooperate with similar groups abroad including the Comité International de Photobiologie.”

Dr. Alfred Kleczkowski from the UK was spending some time at Berkeley and became a participant in the NCPPG and Brian Johnson came to Cornell Medical School im-

mediately after completing his Ph.D. at the University of London and took the initiative in forming the NPG.

Formation of the CPPG

In an undated letter for posting, presumably in 1962, Kendrick Smith invited interest in the CPPG: “Our main function is to provide a means of getting better acquainted with our colleagues and to learn what type of research they are doing and what types of techniques and instruments they are using.”

“We have found that those of us in one specialty of photobiology or photochemistry are woefully ignorant of the vocabulary, techniques and goals of those in another specialty. Therefore the meetings at which reports of current research results have been presented have not been satisfactory for the group as a whole. There was almost a complete lack of discussion by a significant percentage of the group on any one subject when it was presented. We know our own specialty but can keep very quiet when another specialty is discussed so that we do not show our ignorance.”

“Therefore, the research reports presented at our meetings are now patterned after the form used for articles in *Scientific American*. The subject is introduced by a broad base of historical background and vocabulary so that we can then follow the speaker through the intricacies of his experimental approach.”

In another undated letter for posting, Kendrick Smith invited interest in the NCPPG: “The San Francisco Bay Area photobiology and photochemistry group was organized in March of 1962. We currently have 57 members, and meet about five times a year, alternating between Palo Alto and Berkeley. At our meetings, some phase of photobiology or photochemistry is presented in the form of a review, patterned after the style of articles in *Scientific American*. We have thus far not had meetings in which short papers on current research have been presented.”

The use of *Scientific American* as a model for interdisciplinary communication was apparently initiated by Kendrick Smith and was adopted by the other photobiology groups. There is a follow-up footnote to the use of *Scientific American* as a model; in 1968 *Scientific American* published an article on “Sunburn” by Farrington Daniels, Brian Johnson and Jan C. van der Leun (6). Several people since have told the authors that that article aroused their interest in photobiology. The picture of the sunburn was of course an early depiction of an apoptotic cell.

Meetings of the NCPPG generally alternated between Stanford and Berkeley, with some meetings at the UC Medical School in San Francisco and at the Exobiology Division at the NASA-Ames Research Center.

The NCPPG was clearly the initial group, as indicated in a letter from Alexander Hollaender at Oak Ridge to Kendrick Smith on 12 March 1962: “Thank you very much for sending me the material on the get-together of the photobiology group. I think this is an excellent idea and I hope it turns out successfully. As a matter of fact, at the next meeting of the Committee on Photobiology I will suggest that other areas undertake similar things.”

But by April 1974 a letter had to be sent to members of the NCPPG: “Because of the poor turnouts at the last two

meetings, the general apathy, and to a lesser extent because of the fuel shortage, there will be no spring meeting of the NCPPG There were six attendees at the fall meeting in San Francisco and eight at the winter meeting at Stanford. Fifteen of the 83 members paid their \$1 dues for this year.”

The NPG

The NPG was started by Brian Johnson, then an Assistant Professor of Physiology in Medicine at Cornell Medical College in New York City. Meetings were held at Cornell Medical School in 1967, at Harvard University in 1968 and at Cornell University at Ithaca, New York in 1969.

Brian Johnson described the organizational meeting at Cornell Medical School in a letter of 15 August 1967: “Thirty six expressed an interest in participating in a proposed society; eighteen wished to attend the preliminary organizing meeting; nine actually attended. Extrapolation would indicate a functioning group of four and a half persons.”

The meeting at Cornell Medical School, 6–7 October 1967

Sufficient enthusiasm was evident that a regular meeting was held at Cornell Medical School on 6 and 7 October 1967. From the October meeting a remembered example of the interdisciplinary education was given by a speaker who said, “Listen carefully. I am not talking about *cytochrome* but about *phytochrome*.”

The keynote speaker was Jan C. van der Leun, who was finishing a year in the Dermatology Division at Cornell, speaking on the “Physicist’s approach to skin photobiology.”

Meeting at Harvard University, 10–11 May 1968

In a follow-up letter addressed to Dr. Albert Kelner, the discoverer of photoreactivation, and contributed by his widow, Brian Johnson wrote: “I am sending this letter to about 100 photobiologists when the paid up membership consists of only 43. I think that the next bulletin will have to go only to those who have shown sufficient interest to help pay for the production of the letters.”

Organizers for the Harvard meeting were from the Biological Laboratories at Harvard and included Drs. L. Bogorad, W. R. Briggs, J. W. Hastings and R. P. Levine.

Brian commented, that: “Skin photobiologists were intrigued by the surprise of botanists that UVR in sunlight could be damaging to plants. Everybody was amazed at what the skin people had to say and so and so on.”

This confirmed the hope of the organizers that there would be productive interaction between different disciplines as the result of organizing the groups.

George Wald was around but no major contribution from him is recorded. Rose Wald did participate.

Meeting at Cornell University, Ithaca, NY, 9–10 May 1969

In the announcement of the meeting Brian Johnson, the secretary, reminded attendees that Ithaca was “centrally isolated” in New York.

All of the presentations were on photosynthesis. At the dinner, held in the faculty lounge of Ithaca College, there was a charismatic senior man with several young photobiologists clustered around him. He was Eugene Rabinowitch, chemist on the Manhattan Project and the conscience of the scientists involved in developing nuclear weapons. He and Hyman Goldsmith founded the *Bulletin of the Atomic Scientists* in 1945 and Dr. Rabinowitch was for many years its senior editor. The Bulletin featured the clock indicating the number of minutes to midnight. Among his publications was a three-volume treatise on *Photosynthesis and Related Processes* (7). The *Bulletin of the Atomic Scientists* for June (8) 1973 has many fascinating tributes to this giant among our mentors. For example, he was so fluent in English and Russian that sometimes he would translate the speaker’s English into his own English.

At the Cornell meeting in 1969, T. T. Bannister of the University of Rochester was elected President and Richard Klein of the University of Vermont was elected Secretary. They could not locate an institution willing to be host for another meeting.

In commenting on the possibility of reviving the NPG, Richard Klein wrote to Farrington Daniels, Jr. on 15 October 1971: “I’m delighted that there is a possibility that the NE Photobiology Group may get reactivated. I agree that it will probably have to be centered within a major metropolitan area and that the direction must be centralized When added to the meeting-weariness that we all have, things went down hill rapidly and, for me, painfully One key feature . . . will have to be diplomatically worked out and this is the problem of domination by photosynthesizers. They scare off or bore out others”

Photochemistry and Photobiology Group of the Biophysical Society (PPG)

The PPG was also initiated by Kendrick Smith. Some of the problems faced in dividing societies up in various ways are indicated in a letter to the membership of the Biophysical Society for the meeting of 27 February 1969 by Manel F. Morales: “While we think it would be very unwise to splinter the Society into factions having nothing to do with one another, we recognize that each of us has some specialty within biophysics, and that there is a legitimate place for engaging in specialized activities, as long as allegiance and interest in biophysics broadly defined are maintained.”

He goes on to say that splintering of some organizations could be avoided by the appropriate recognition of groups.

Chairmen of the PPG from 1970 to 1978 were Kendrick Smith, John Jagger, Milton Gordon, Gordon Tollin, Warren Butler, J. W. Longworth, Walter Stoekenius, and J. W. Longworth. Secretaries from 1971 to 1978, included Robert Pearlstein, John S. Cook, John Lee and John P. Pooler. Membership was: 1970—133, 1971—about 200, 1973—184, 1975—161, 1977—156, and 1978—135.

The end of the PPG of the Biophysical Society was described in a letter from John Pooler of Emory University to Kendrick Smith at Stanford on 18 August 1981: “The event which triggered the ending of the subgroups was the placing of the ASP and Biophysical Society meetings back to back in 1976. Many photobiologists did not have the energy, time

or money to go straight from . . . Denver . . . to Seattle. As a result no one showed up for the business meeting (I was the only one there)."

"While it seems a little sad that the subgroup died, . . . it is really a tribute to the success of ASP."

The SCPG

There is less early correspondence about the SCPG than the others, but John Jagger wrote a history of the group which is in the Archives: "In 1965, Dr. Richard Setlow, then Chairman of the Committee on Photobiology of the National Research Council, wrote to John Jagger requesting that he form a regional photobiology group. The Committee on Photobiology wished to increase the number of such groups, hoping that this would eventually lead to the establishment of a national society."

Jagger sent out a questionnaire and received 35 indications of interest from Texas, 10 from Oklahoma, and 3 from Louisiana. An organizational meeting was held at College Station, TX in the fall of 1969, to form the SCPG.

Presidents of the Society were, chronologically, John Jagger, Keith McCree, Homer Black and Roger Hewitt. They served simultaneously as Secretary/Treasurer.

Attendance had decreased from around 25 to about 10 in 1977. "It may be noted that the other two local photobiology groups . . . have also ceased to function. This is consistent with their having come into existence in order to stimulate the formation of a national society for photobiology . . . We think it is a healthy thing if once in a while a society or a journal decides to self-destruct."

The No-name Group of medical photobiologists, including associated Ph.D.

The call for a first meeting was in a letter sent out on 14 June 1962 by Farrington Daniels, Jr., then Associate Professor of Dermatology at the University of Illinois in Chicago. "Several people including John Epstein and Leonard Harber have suggested that a meeting on methods be held in an informal manner on the day preceding the Investigative Dermatology meeting, that this meeting be restricted to a few of the more active and puzzled workers in the field of light sensitivity . . . The group will assemble . . . at the Univ. of Illinois Research and Education Hospitals."

"The decision as to who is riding a hobby horse too long will be final, and no hobby horses will be returned at the end of the competition."

Some features of the first meeting in Chicago were remembered in the invitations to later meetings. For example the invitation by Farrington Daniels for the 1965 meeting at Cornell Medical School included: "As Harvey Blank predicted with remarkable precision at the 1962 meeting of this non-group at the University of Illinois, the group has now reached a point where it is weakening itself in its own fermentations. He predicted that the group would become larger very rapidly, that we would be faced within 5 years with the decision as to whether to discontinue because of the loss of informality and spontaneity or to organize into a more formal organization. We have already rejected several worthwhile nominees for participation in the effort to keep the

organization small, but still we are having to make changes in the physical arrangements for the meeting.

"A formal organization would relieve the 'host' of the need to explain to interested parties why they weren't included in the classification of 'young productive workers still at the bench'."

It may have no particular significance but, at later meetings, measures to prevent spread-out loquacity referred not to riding hobby horses but to "beating dead horses." This appeared in the invitation to the "Fourth occasional meeting on 2 May 1969" from Ron Davies of Temple University: "Invitations to participate and details of scheduling are in the hands of a self-appointed committee responsible to no one . . . Discussion and ideas presented may be stolen but not cited. As an innovation this year, we are requesting that participants voluntarily limit themselves to the organized beating of not more than one (1) dead horse . . . In case of duplicate entries, decision of the judges will be arbitrary."

The author remembers meetings of the No-name Group at the University of Chicago, with Dr. Al Lorincz as host, and at New York University Medical School with Dr. Leonard Harbor as host, but these meetings are not documented in the Photobiology Archives.

In contrast to the other groups, the No-name medical photobiologists did not disappear, but became the Photobiology Task Force of the American Academy of Dermatology, where they became an advisory panel on skin cancer, sunscreens and such things as tanning booths. They, of course, lost the interdisciplinary excitement as they became administratively useful.

DID THE REGIONAL PHOTOBIOLOGY GROUPS ACCOMPLISH ANYTHING BEYOND HELPING START THE ASP?

The answer is an emphatic yes and is attested to in the memories of the participants. The groups exposed members of each discipline to the knowledge, problems, insights and methods of the others in an informal interchange. It is fair enough to call this intellectual romancing—after all we talked without inhibition of cross-fertilization. One of the laments hinted at in some of the quoted correspondence was the problem of people "wanting to bring one of their juniors" for his benefit. That is a laudable objective, but it takes away from the interplay of "young active investigators still at the bench," which was so important. The newness, the informality, the opening of windows onto other vistas and the presentations that do not have to be prepared for publication were all intellectually freeing.

Some of the rules may be useful elsewhere.

1. Questions are asked for information, not to achieve an effect. Hyman Rickover is said to have answered once, "you didn't want to ask a question—you wanted to give a speech."
2. There are no stupid questions. No questioner is to be put down.
3. In the words of Ron Davies, "ideas may be stolen but not cited."
4. Personal research findings can be used to open discussion but these are not papers to be published.
5. No discussion, however brilliant, can substitute for a

good experiment. Interdisciplinary discussion leads to better experiments.

6. These were not completely free-wheeling discussions; they might appear as such to an outside observer, but each participant was based in the discipline of his own field.

7. It may be that the free-wheeling interchange in the five societies is something that can be enjoyed only when fields are being established, when they are still close to the observations in nature that start science going. However, if national and international meetings are to broaden your outlook you have to look around beyond your own hyperspeciality.

Acknowledgements—The Photobiology Archives were established by Alexander Hollaender at the University of Tennessee. The address is: The University of Tennessee, University Archives and Special Collections, Hoskins Library, 1401 Cumberland Avenue, Knoxville, TN 37996-4000, USA. Fax: 423-974-0560.

I am indebted to William Eigelsbach of the Archives for selecting and photocopying the letters quoted in this paper.

REFERENCES

1. Rothman, S. (1954) *Physiology and Biochemistry of the Skin*. University of Chicago, Chicago.
2. Blum, H. F. (1941) *Photodynamic Action and Diseases Caused by Light*. Reinhold, New York.
3. Hollaender, A. (ed.) (1955) *Radiation Biology*, Vol. II. McGraw, New York.
4. Smith, K. (1997) *Photochem. Photobiol.* **65S**, 116S–118S.
5. Smith, K. (1982) History of the American Society for Photobiology (ASP). *Photochem. Photobiol.* **35**, 597–614.
6. Daniels, F., Jr., J. C. van des Leun and B. E. Johnson (1968) Sunburn: What happens to human skin, its various types of cells and their molecular constituents when it receives an overdose of ultraviolet radiation? *Scientific American* **219**, 38–46.
7. Rabinowitch, E. (1945) *Photosynthesis and Related Processes*, Vol. 1. Interscience, New York.
8. (1973) *Bull. Atom. Sci.* **29**, 2–15.