Current Plant Biology 13 (2018) 2–5

Contents lists available at ScienceDirect

Current Plant Biology

journal homepage: www.elsevier.com/locate/cpb

Remembering Professor Prasanna K. Mohanty (April 1, 1934 – March 9, 2013)

Sushma Naithani[a,*], Govindjee[b]

[a] Department of Botany and Plant Pathology, Oregon State University, Corvallis, Oregon, 97331, USA
[b] Department of Plant Biology, Department of Biochemistry, Center of Biophysics & Quantitative Biology, University of Illinois at Urbana-Champaign, 265 Morrill Hall, 505 South Goodwin Av, Urbana, IL, 61801-3707, USA

ARTICLE INFO

Keywords:
Photosynthesis
Prasanna K. Mohanty fellowship
Photosystem

ABSTRACT

On March 9, 2018, 5 years had passed since Prasanna K. Mohanty, an extraordinary student of photosynthesis, plant biologist par excellence, a pioneer of *Light Regulation of Photosynthesis*, a renowned mentor, and a friend of a vast international community of scientists left us. Many of us, who knew him, miss him dearly and cherish his fond memories. Here we include some of the late responses we have received from many friends of Prasanna Mohanty and announce the launch of Prasanna K. Mohanty fellowship for young researchers working in the area of photosynthesis by the International Society of Photosynthesis Research.

Prasanna Mohanty was born on April 1, 1934 in Keshpur, a small village in Odisha, India. He obtained his Bachelor's and Master's degrees in Science from Utkal University, and his Ph.D. from the University of Illinois at Urbana-Champaign (UIUC), USA under the supervision of one of us (Govindjee) in 1972. After a brief postdoc at the University of Western Ontario, Canada, he joined, in 1973, the School of Life Sciences, Jawaharlal Nehru University (JNU), New Delhi, India as an Associate Professor, where he was promoted to be a full Professor of Bioenergetics. Until his retirement in 1999, he taught and trained many students and postdocs at JNU, and established several national and international collaborations. He continued his teaching and research interests for another decade while serving as an emeritus scientist or a visiting faculty at various institutes in Indore, Hyderabad and Bhubaneshwar.

Much of Prasanna Mohanty's scientific contributions are in the area of photosynthesis. He was a pioneer in the field of photobiology and photochemistry, especially photosynthesis, exploring the use of chlorophyll *a* fluorescence in monitoring the regulation of photosynthesis. His contributions are enormous and wide-ranging. He had published in many journals including Biochimica et Biophysica Acta; Current Science; FEBS Letters; Journal of Photochemistry and Photobiology; Nature; Photochemistry and Photobiology; Photosynthesis Research; Physiologia Plantarum; Plant Cell Physiology; Plant Physiology; and Science, among others. In addition, he also served as Editor or Co-editor of various journals and books and received several awards and honors including: Founder Fellow of the National Academy of Agricultural Sciences (India); Founder Member of the Society for Scientific Values; Fellow of the National Academy of Sciences (India), Allahabad; Gold Medal of the National Academy of Sciences (India); the Robert Emersion Fellowship of the University of Illinois at Urbana-Champaign, to name just a few.

Prasanna Mohanty inspired many young researchers in his laboratory and in the broader scientific community. He was always keen on research questions, and spent a great deal of time talking with young researchers at conferences or at casual sittings. His academic approach was student-centered and he viewed scientific research as a selfless enterprise. He had a great collaborative spirit and enthusiasm for doing research and inspired countless graduate students and postdocs to do the same in spite of challenging circumstances. His lab was a refuge for many scientists working across India in small colleges or universities where research facilities were inadequate and financial resources were meager. He trained many informally, and often helped them to procure expensive chemicals or reagents or antibodies or probes, using his national / international connections. He himself remained mostly underfunded, but produced great work as evident from a long list of his outstanding publications.

In his last years before retirement, Prasanna Mohanty also served as the Dean of the School of Life Sciences at JNU. The power associated with such an administrative post neither shadowed his humanity, nor his research interests. Whenever he walked on the JNU campus, he greeted all fourth-class employees, canteen boys, students or fellow professors with the same enthusiasm and love. He valued everyone as his equal irrespective of his or her status, age or origin, or gender or physical (dis)abilities.

* Corresponding author.
E-mail addresses: naithans@science.oregonstate.edu (S. Naithani), gov@illinois.edu (Govindjee).

https://doi.org/10.1016/j.cpb.2018.05.002

Fig. 1. Left to right: George C. Papageorgiou (1968 Ph.D.) with Prasanna K. Mohanty (1972 Ph.D.). Date and source: unknown. From Govindjee's collection.

Two of Mohanty's Ph.D. students (Swati Tiwari and Baisnab Tripathy), his teacher & mentor (Govindjee), one of his post-doc advisors (Norio Murata), and two of his contemporaries (Raj Sane and A. B. Das) have presented a detailed Tribute to his life and his career (see Tiwari et al. [1] ; also see: Prakash and Tiwari [2]). In addition, George Papageorgiou, a contemporary of Prasanna (see Fig. 1), wrote a beautiful memoir on him with a quote "Burning bright, in the forests of the light" [3]. The Tribute [1] contains wonderful reminiscences from more than thirty international scientists from many countries including Canada; Germany; Greece: Hungary; India; Japan; Poland; South Korea; and the USA (Fig. 2 shows Mohanty with his mentor Govindjee and 3 contemporaries

Fig. 2. A 1995 group photograph. Left to right: (front row): Julian J. Eaton-Rye (1987 Ph.D.); Govindjee; Thomas T. Wydrzynski (1977 Ph.D.); Prasanna K. Mohanty (1972 Ph.D.) ; (second row): Danny J. Blubaugh (1987 Ph.D.); George C. Papageorgiou (1968 Ph.D.). From Govindjee's collection (used previously as Figure 4 in J.J. Eaton- Rye (see Ref. [4]).

from UIUC). Yet, beyond his close associates many of his friends in the plant research community didn't learn about his demise immediately. Every day we learn more about his associations and influence on several researchers beyond those whom he directly supervised or published his research with. Here are some of those heartening responses, which mirror the impressions that many of us share:

Animesh Ray, Keck Graduate Institute, California, USA:
"I didn't realize Dr. Mohanty had passed away many years ago. I was a student at JNU, the first cohort of M.Sc. in the School of Life Sciences in 1975. I spent innumerable hours with him, both in and out of classrooms and laboratories, in 'dhabas' and walking around with him. Once my wife and I were walking to the laboratory in the summer of 1978, there was a storm (an Aandhi). Dr. Mohanty came running down the street from his home and escorted us into his home, because he thought we, both rather thin at the time, would be blown away by the storm! He was a humble human being, with a great heart."

Sushma Naithani, one of the authors, added:

"I had known Professor Prasanna Mohanty since 1990, when I was a M.Sc. student at Maharaja Sayajirao University (MSU) of Baroda. I met him for the first time by a coincidence while visiting the main library of the Jawaharlal Nehru University to gather some research articles. He was heading for lunch and instantly invited me to join him in the library canteen. He enquired about my research project, Center for Biotechnology at MSU, and my journey from a small Himalayan village Bistana, Pauri Garhwal to Baroda (Gujarat). I was working on the mechanisms that help bacteria to survive under osmotic stress. I learned that Mohanty's group was studying the effects of various abiotic stress conditions (e.g., heat, salinity, low temperature, and metal toxicity) on photosynthesis. As a first-generation college student, I had little opportunity for a casual conversation with any scientist of such eminence. The generosity and kindness in his manners encouraged a shy student like me to speak freely and discuss few ideas about my research without worrying about my inadequacy in English. He narrated his own journey from a small town in Odisha to JNU. He talked about random jobs he had held before joining post-graduation – including a cashier's job in a construction project; his inclination towards biology, photosynthesis, the uniqueness of each organism, and why biology has no simple and unequivocal answers for a process or problem, gave me remarkable insights. This brief meeting inspired me to become a plant biologist and set inkling for an academic career. It also gave me the personal courage to withstand snobbery that is so prevalent in the system of higher education, especially at elite institutions.

After graduating from MSU in 1992, I joined the Ph.D. program at the National Botanical Research Institute (NBRI), Lucknow, and worked on the sequencing and characterization of the Photosystem II genes. I talked to Prasanna Mohanty from time to time about my research, visited his laboratory a few times, and published two papers in journals where he served as a guest editor. He edited each manuscript with great detail and brought out the life in them, and helped me highlight the major points. Professor Mohanty also served as an external examiner for my Ph.D. thesis at University of Lucknow, India (see Fig. 3). He appreciated the volume of my work and my efforts, but also offered constructive criticisms without any hesitation. Even today, he inspires me to excel and to take an initiative.

Fig. 3. Left to right: Sushma Naithani, P. K. Mohanty, Rakesh Tuli, N. K. Mehrotra, and P. V. (Raj) Sane at the Department of Botany, Lucknow University, Feb 1999. Source: Sushma Naithani's collection.

In 1998, I left India for a postdoc position at Iowa State University. I visited Prof. Mohanty and his wife Basanti Mohanty in 1999 for the last time at their home on the JNU campus. Mrs. Mohanty had prepared traditional Odia food for dinner and welcomed me like a mother in spite of health problems she was facing. I had brought for her a few dietary and healthcare books intended for folks suffering from heart disease and diabetes. Professor Mohanty wanted to re-design diet of his wife to support her health. After his retirement, the family moved to Odisha. I couldn't manage to visit him afterwards, but continued email exchanges until 2007. In November 2013, I learned that Prasanna Mohanty had passed away several months earlier (March 9, 2013). It is a great solace to know that he was well cared for in the last years of his life.

In the past 20 years or so, I have met many scientists from India and other countries who remember Dr. Mohanty. I firmly believe that a small tribe can be formed in his name. If someone asks me how best to motivate young people to pursue careers in STEM (**S**cience **T**echnology **E**ngineering and **M**athematics), I would say that scientists, professors and professionals of all ranks should endorse humanity, kindness, and vision of Professor Mohanty to make science an international and truly selfless, collaborative enterprise. I have moved away from photosynthesis research, but my bond with the community remains intact because of the great teachers and colleagues. With this community, I cherish the fond memories of Dr. Prasanna Mohanty."

Arun Goel, Elgin Community College, USA:

"I was not aware that Prof. Mohanty had passed away in 2013. My last meeting with him was in Montreal at the Photosynthesis Congress. He was the best and most dedicated Photosynthesizer I have ever met."

Autar Mattoo, USDA_ARS, Beltsville, Maryland, USA:

"Prasanna was a jovial and a serious photosynthesis researcher. I am glad our paths crossed. I was an outsider to the plant physiologists, in particular, photosynthesis researchers, within India. In 1980s Prof. Gauri Singhal took upon himself to bring me into the Plant Biology community at the School of Life Sciences, JNU, New Delhi. Because of my frequent visits thereafter to JNU, I became familiar with the science carried out by the faculty there. Dr. Prasanna Mohanty was one of the faculty members who took a keen interest in befriending me and learning my laboratory's inroads into the heart of photosystem II reaction center, the D1 protein, which was then an unknown protein and called 32kD protein. Prasanna was a keen observer, a simple and slightly shy but a smart human being, with a hidden smile. He was a first-class scientist. His contributions to stress-induced effects on photosynthesis and photosystems stand out! I enjoyed my interactions with him and the questions he asked were well thought out and hit the nail on the subject matter. After I gifted him our antibody to the D1 protein, he published a manuscript where he acknowledged the source of D1 antibody (it was not commercially available at that time). The next time I met him he was happy to tell me that they had made progress into stress and PSII protein involvement. He thanked me, which was not needed, but it endorsed within me the thought that he was a special person, very sincere and an ethical scientist. It is sad that we lost him and my other friend Gauri Singhal too early in life. May their souls Rest In Peace!"

Wricha Tyagi, Central Agricultural University, Imphal, India:

"Prof. Mohanty was unique and a superb soul. He is one of the teachers I still recall and talk about with the students that I teach. He taught me biochemistry I and II during my masters studies, and he can be credited for inculcating the attitude of interpretation of data and application of basics without getting bothered by the outcome of passing the exams. Most importantly, he was always approachable and kind."

David Stern, Boyce Thompson Institute, Ithaca, USA:

"I did not know about his death, but had thought about Prasanna from time to time. At Carnegie, we were only casual acquaintances, but because we both kept long hours, we got to know each other a bit. Near the end of his stay at Carnegie, Prasanna took me and a technician, Jerome Lapointe, out for an Indian meal at a local restaurant. He insisted on doing all the ordering, and he ordered in Hindi. We found out that Prasanna was testing our capacity to enjoy some of the spiciest food that could be found in Palo Alto. It was a wonderful meal, but not for the faint of heart. However, I found out a lot more about him in the tribute [see Ref. 1], as might be expected, than I ever learned in person. He was such a gentleman, as everyone has said, and always looked so happy and optimistic. We certainly need more of that in science (and in our country) these days."

Finally, we end this section on reminiscences with remarks from one of us

(**Govindjee**):

"I remember Prasanna as one of the best doctoral students in Plant Biology at the University of Illinois at Urbana-Champign (UIUC), during the 1970s, and one of the best teachers and researchers in Life Sciences, at the Jawaharlal Nehru University (JNU), New Delhi, India, during the

1980s–2000. He was loved and respected by his teachers, but also by his fellow students, as well as by the many students he taught later. He was indeed a unique and a great human being, a loving and dedicated teacher—unpretentious, and idealistic. I recall his dedication to work and his cooperative spirit the day he arrived in my laboratory at UIUC; his thesis was one of the most detailed and thorough ever written under my supervision. In 1973, he made the very first demonstration of the fast (up to one second) chlorophyll Chl *a* fluorescence changes in cyanobacteria, and provided an in-depth analysis of the relationship of slow Chl *a* fluorescence changes (up to 5 min) in cyanobacteria with structural changes. His cooperative spirit was unique: he was the first one to work almost night and day with at least 5 of my other outstanding and brilliant Ph.D. students: John Munday (Biophysics); George Papageorgiou (Biophysics); Ted Mar (Biophysics); Barbara Zilinskas (Plant Molecular Biology); Tom Wydrzynski (Biophysical Chemistry). Further, it is highly impressive and unmatched for a Ph.D. student to have published 10 original papers and 3 reviews, while working as a Ph.D. student. I considered him to be one of my best students, most liked and most cooperative. He was clearly very intelligent, and did his research independently of my thoughts, but always with unmatched politeness and candor. He was clearly dedicated to high-quality research as well as teaching. The only negative thing I could ever find in him was his handwriting, which was quite difficult to read. But, so is that of many well-known leaders."

It is a great pleasure to know that in recognition of his life and research contributions, friends and colleagues of late Professor Prasanna K. Mohanty in collaboration with the International Society of Photosynthesis Research have established a fund to support young research scientists working in the area of photosynthesis. We encourage all to donate to this cause by going to the following site: http://www.photosynthesisresearch.org/page-1853109. One can also contact the Treasurer of ISPR (Professor Robert Burnap) by e-mail: treasurer-at-photosynthesis-research.org.

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