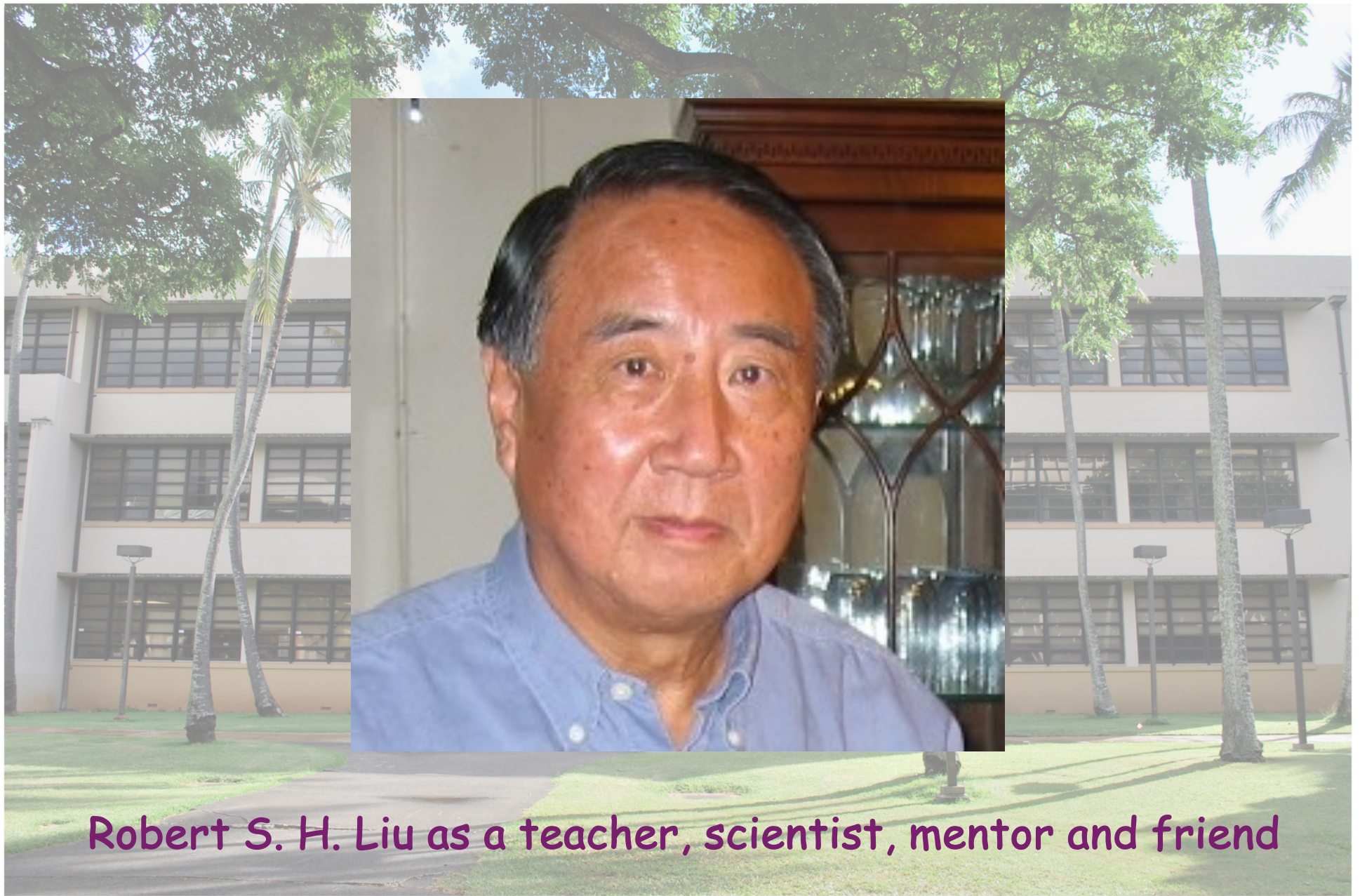




Robert S. H. Liu as a teacher, scientist, mentor and friend

Liu's academic research life



With his mentor George S. Hammond

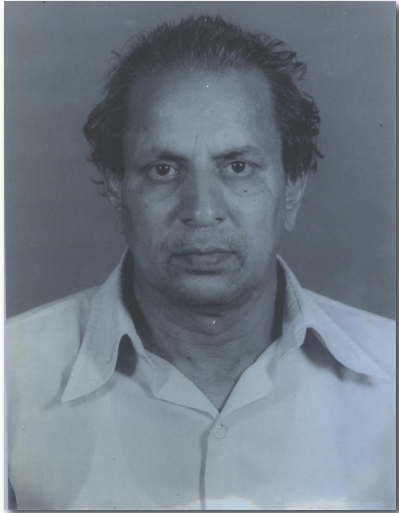
Mainland China
Hong Kong
Howard Payne College
Caltech
DuPont
UH

GSH & RSHL, "Stereoisomeric Triplet States of Conjugated Dienes,"
J. Am. Chem. Soc., 85, 477-478 (**1963**).

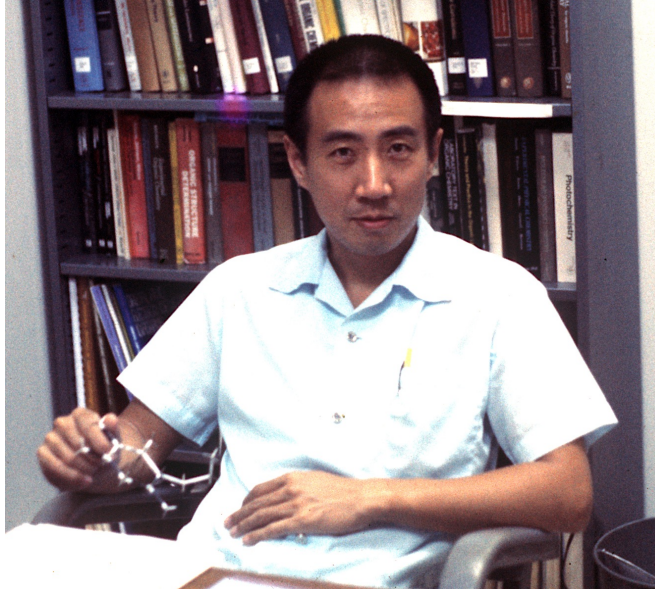
RSHL & GSH, "Reflection on Medium Effects on Photochemical Reactivity,"
Acc. Chem. Res., **38**, 396-403 (**2005**).

My scientific beginning

"Go to UH and
work for Liu"



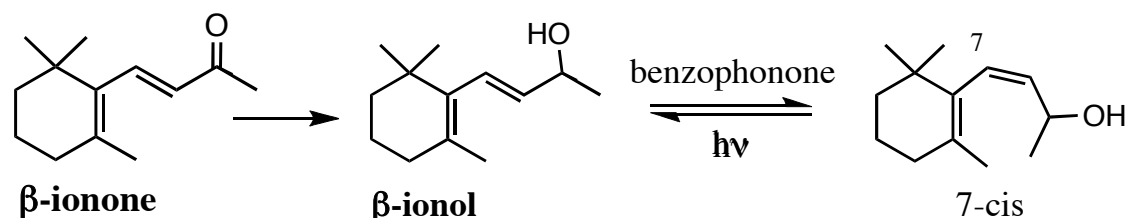
V. Ramakrishnan
IIT, Madras



Liu in 1970's
Trusted student?



A Man of Unconventional Wisdom



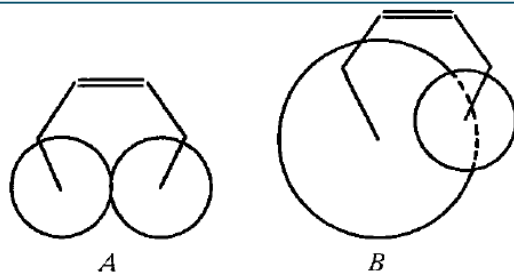
291. Zur *cis-trans*-Isomerisierung von Carotinoiden

von Linus Pauling.

(16. VI. 49.)

From the structural parameters it can be calculated that if X and X' are both hydrogen atoms they will be 1.7 Å apart. This is somewhat less than the usual distance of *van der Waals* contact (2.0 to 2.4 Å), and will tend to make the molecule less stable than for the *trans* configuration (with R, R' = H); but the strain could be removed in large part by small rotations about the bonds 1.2 and 3.4. On the other hand, with X = methyl or some similar group and X' = H the distance is only 1.6 Å; this is so very small compared with the expected distance of *van der Waals* contact, 3.2 Å, that the *cis* configuration would

surely be unstable. Hence we conclude that *the cis configuration will be assumed only by those double bonds which are of the type =CH—CR=CR'—CH=*; that is, which are adjoined by two CH groups."



A day in the lab saves many years of doubt from the library!

RSHL

An hour in the library saves three months in the laboratory!

NJT

Photochemistry in the Middle of Pacific Ocean

T_2

7-Cis

Rhodopsin

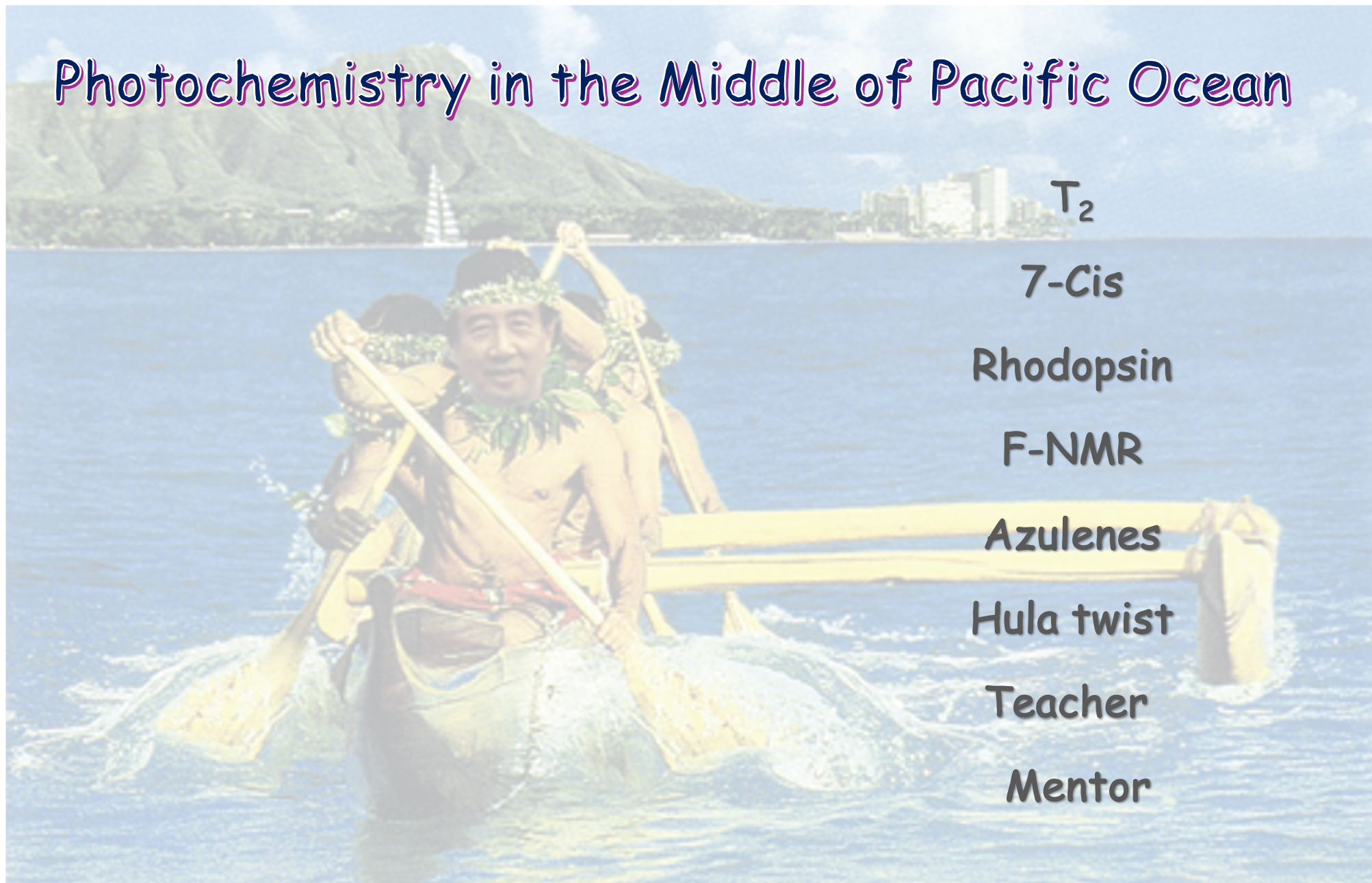
F-NMR

Azulenes

Hula twist

Teacher

Mentor



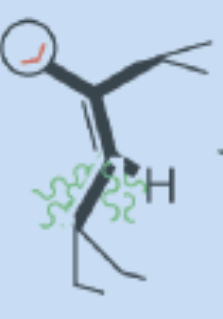
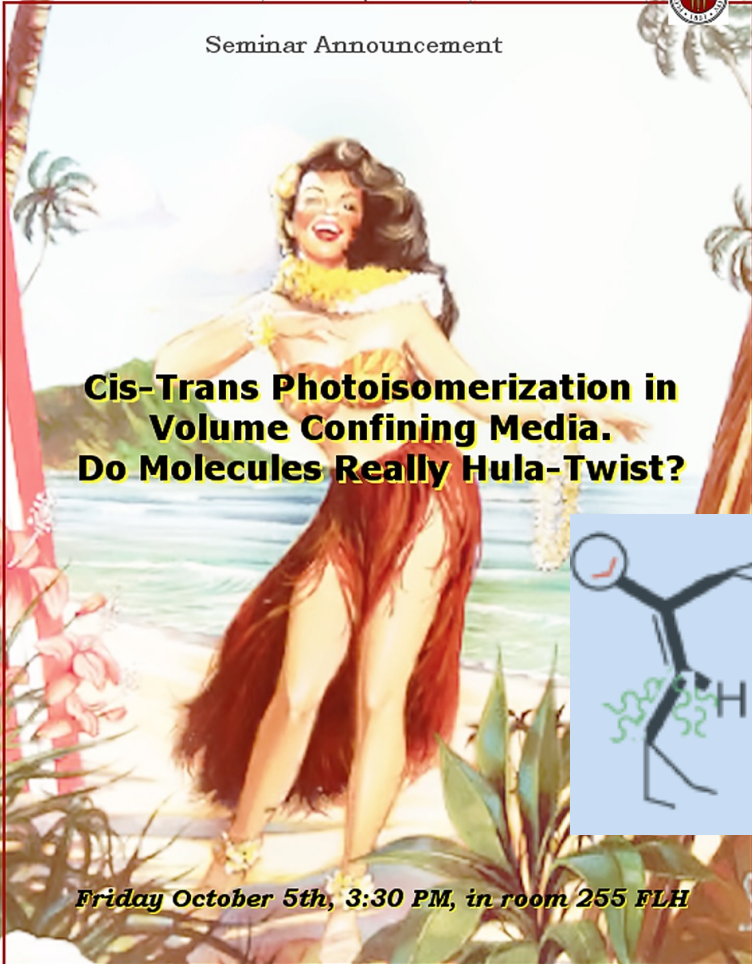
Birth of Hula-Twist

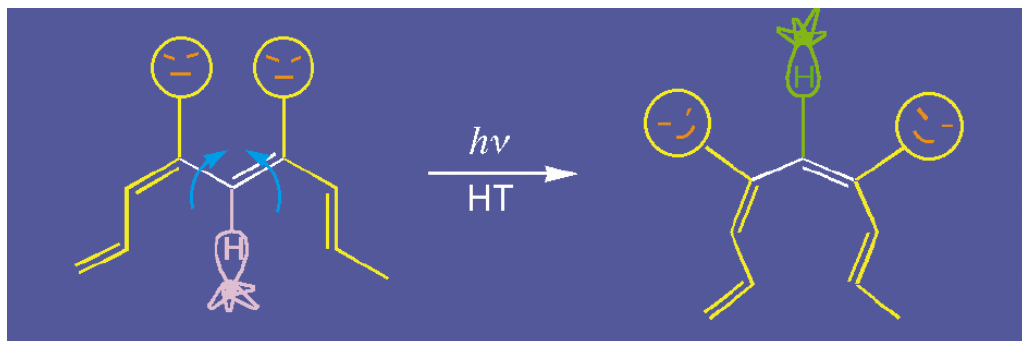
The Department of Chemistry and Biochemistry

Seminar Announcement

**Cis-Trans Photoisomerization in
Volume Confining Media.
Do Molecules Really Hula-Twist?**

Friday October 5th, 3:30 PM, in room 255 FLH





Proc. Natl. Acad. Sci. USA
Vol. 82, pp. 259–263, January 1985
Chemistry

The primary process of vision and the structure of bathorhodopsin: A mechanism for photoisomerization of polyenes*

(lumirhodopsin/hypsochromodopsin/binding site/concerted twist)

ROBERT S. H. LIU AND ALFRED E. ASATO

Department of Chemistry, 2545 The Mall, University of Hawaii, Honolulu, HI 96822

Communicated by George S. Hammond, September 10, 1984

42

Acc. Chem. Res. 1986, 19, 42–48

A Bioorganic View of the Chemistry of Vision: H.T.-n and B.P.-m,n Mechanisms for Reactions of Confined, Anchored Polyenes[†]

ROBERT S. H. LIU* and DOUGLAS T. BROWNE[†]

Department of Chemistry, University of Hawaii, Honolulu, Hawaii 96822

Hula-Twist ?

ARTICLE

DOI: 10.1038/s41467-018-04928-9

OPEN

Direct evidence for hula twist and single-bond rotation photoproducts

Aaron Gerwien¹, Monika Schildhauer¹, Stefan Thumser¹, Peter Mayer¹ & Henry Dube¹

ARTICLES

PUBLISHED ONLINE: 3 FEBRUARY 2013 | DOI: 10.1038/NCHEM.1565

nature
chemistry

Volume-conserving *trans-cis* isomerization pathways in photoactive yellow protein visualized by picosecond X-ray crystallography

Yang Ouk Jung^{1,2}, Jae Hyuk Lee², Joonghan Kim², Marius Schmidt³, Keith Moffat^{4,5}, Vukica Šrajer⁵ and Hyotcherl Ihee^{1,2*}



Article

<https://doi.org/10.1038/s41467-022-34640-8>

Protein control of photochemistry and transient intermediates in phytochromes

Received: 28 June 2022

Accepted: 1 November 2022

Giacomo Salvadori¹✉, Veronica Macaluso¹, Giulia Pellicci¹, Lorenzo Cupellini¹, Giovanni Granucci¹ & Benedetta Mennucci¹✉

dynamics simulations to reveal the molecular details of such control for the *Deinococcus radiodurans* bacteriophytochrome. Our simulations reveal that chromophore photoisomerization proceeds through a hula-twist mechanism whose kinetics is mainly determined by the hydrogen bond of the chromophore with a close-by histidine. The resulting photoproduct relaxes to an early intermediate stabilized by a tyrosine, and finally evolves into a late inter-

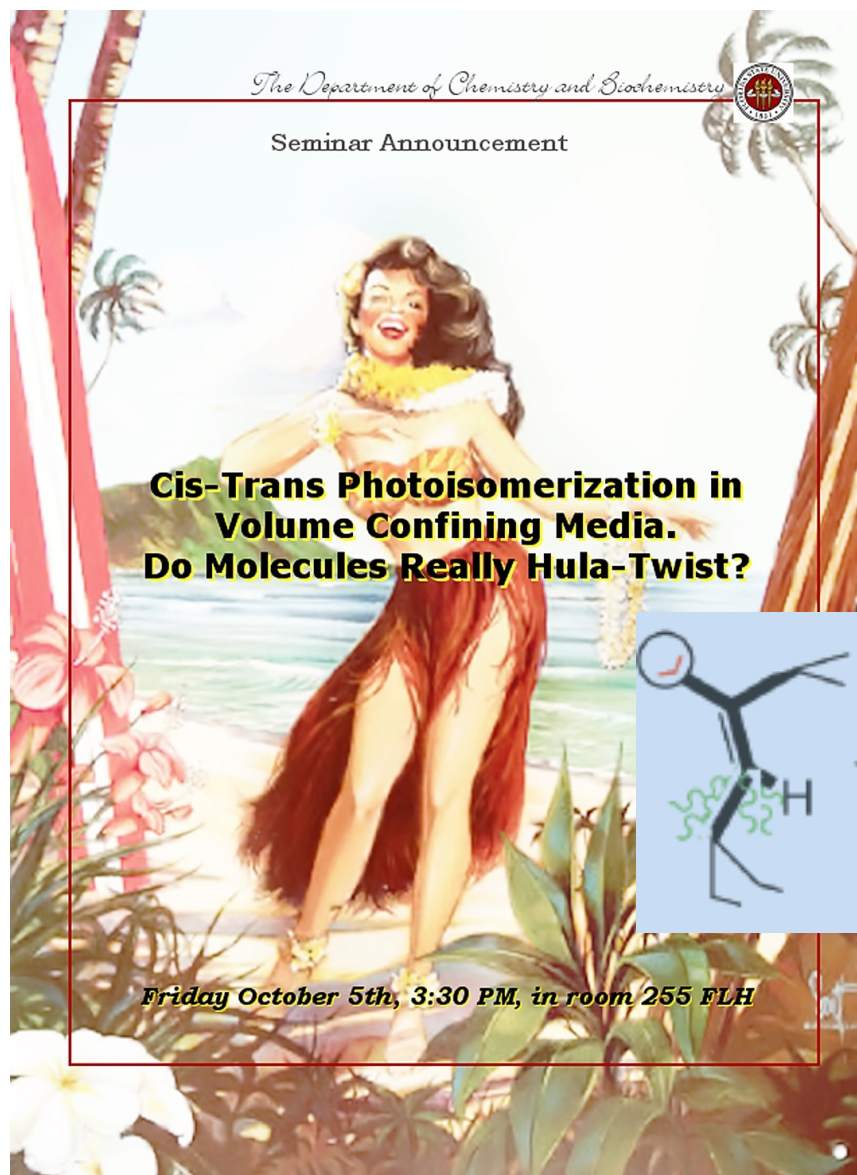
Hula-twist is real

The Department of Chemistry and Biochemistry

Seminar Announcement

**Cis-Trans Photoisomerization in Volume Confining Media.
Do Molecules Really Hula-Twist?**

Friday October 5th, 3:30 PM, in room 255 FLH



June 7, 2024

"I put Hula twist in line with the "Eureka" by Archimedes in his bathtub, discovering density, and Kekule, dreaming about the snake biting his tail, and coming up with the benzene structure. I see Bob sitting under a palm tree on Hawaii, thinking about movements of molecules, looking at Hula dancers."

Prof. Dr. René M. Williams
Molecular Photonics Group
University of Amsterdam

June 7, 2024

"All this work was initiated and heavily inspired by Liu's work and his ingenious idea of coupled motion photoreactions, which we hope to explore much further in the future"

Prof. Dr. Henry Dube
Chair of Organic Chemistry I
91058 Erlangen, Germany



A cover art for HT in 2023?

About the Cover:

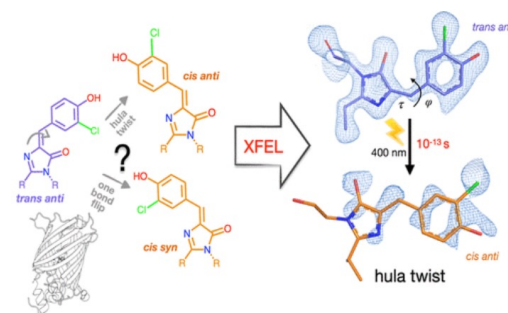
The laser pump-X-ray probe setup is shown to resolve the protein chromophore isomerization reaction. The pathway is acknowledged by placing the protein with a Hawaii background, as originally referenced by Liu and Asato through the name "hula twist". Protein microcrystals of the delivery matrix are also illustrated.

Serial Femtosecond Crystallography Reveals that Photoactivation in a Fluorescent Protein Proceeds via the Hula Twist Mechanism

Alisia Fadini, Christopher D.M. Hutchison, Dmitry Morozov, Jeffrey Chang, Karim Maghlaoui, Samuel Perrett, Fangjia Luo, Jeslyn C.X. Kho, Matthew G. Romei, R. Marc L. Morgan, Christian M. Orr, Violeta Cordon-Preciado, Takaaki Fujiwara, Nipawan Nuemket, Takehiko Tosha, Rie Tanaka, Shigeki Owada, Kensuke Tono, So Iwata, Steven G. Boxer, Gerrit Groenhof, Eriko Nango*, and Jasper J. van Thor*

Journal of the American Chemical Society 2023, 145, 29, 15796-15808 (Article) [Open Access](#)

Publication Date (Web): July 7, 2023



An honoree at the ACS 1988 annual meeting

Celebration of the "Photochemical Tie to 1938"

In appreciation of the contributions of six photochemists born in the year of 1938, a symposium will be held. The symposium will take place during the Fall 1998 ACS National Meeting (August 23-27, 1998) in Boston. You are cordially invited to participate in this historical event.

Honorees (will also speak at the symposium):

R. S. H. Liu
D. C. Neckers
J. Saltiel

N. J. Turro
P. J. Wagner
D. G. Whitten

**Six GSH's
students and
Liu's colleagues**

Speakers at the symposium include the following:

D. R. Arnold
P. F. Barbara
J. K. Barton
I. Bronstein
R. A. Caldwell
W. J. DeGrip
F. C. De Schryver
M. A. El-Sayed
S. Farid
M. D. Forbes
M. A. Fox
E. R. Gaillard
T. Gillbro

R. S. Givens
J. L. Goodman
I. R. Gould
H. B. Gray
G. S. Hammond
E. F. Hilinski
H. Inoue
Y. Inoue
M. Irie
Y. Ito
W. F. Jager
W. S. Jenks
L. B. Johnston

M. Kasha
C. V. Kumar
F. D. Lewis
T. J. Meyer
J. Michl
H. A. Morrison
K. Nakanishi
D. G. Nocera
K. S. Schanze
J. R. Scheffer
D. I. Schuster
G. B. Schuster
R. E. Schwerzel

Y. Shichida
S. C. Shim
M. B. Sponsler
J. K. Thomas
L. M. Tolbert
M. Tsuda
C. Turro
D. H. Waldeck
R. G. Weiss
N. C. Yang
O. C. Zafiriou
R. G. Zepp
H. E. Zimmerman

**Speakers:
Who is who in
photochemistry?**

Four full days

For details, see the world wide web site at <http://www.chem.fsu.edu/photo38.htm>.

ACS symposium celebrating the 60th birthday of Liu & colleagues



Photochemists' Festschrift Preface

The Journal of Physical Chemistry A 1998, 102, 28, 5313 (Article)

Publication Date (Web): July 9, 1998

Continual support beyond Hawaiian days



Around the world



With students and friends



Invincible Liu?



Liu's portrayal of me

- Tennis
- Bridge
- Ballroom dancing
- Photography
- Magic
- Water-slide

“I remember him for his love of tennis. As a student we would play from time to time at lunch. Bob would always win.”

Roger Campbell

Liu, the teacher who shaped my career



Working beside an industrious and gifted scholar, he who is lacking in will-power can receive the baptism of fire in research.

Santiago Ramón y Cajal, Nobel Prize in Physiology 1906

The most important event in the career of a young scientist is the personal contact with great scientists of his time.

Otto Warburg, Nobel Prize, Physiology, 1931

Guru and Mentor for Life



⊗ Robert Liu <rshl@hawaii.edu>

To: ⊗ Ramamurthy, Vaidhyanathan; Cc: Kay ✓

“Here is your first lesson ----- CCRC stands for Continuing Care Retirement Communities.-----

Well, that's lesson 1. No charge on this one!”

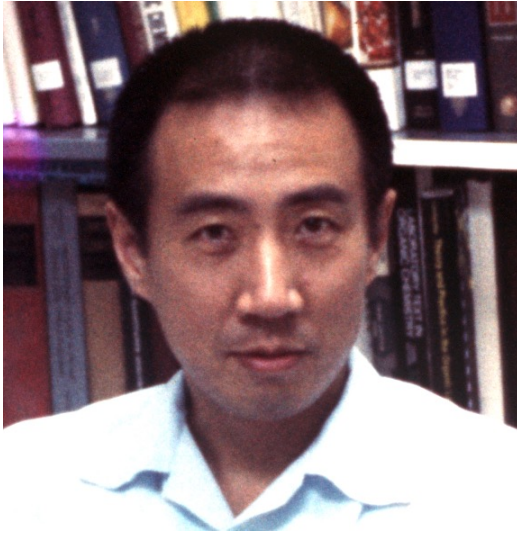
Who is a Guru (teacher)?

He who has found the truth and
is always concerned for the
welfare of his students

Adi Sankara
8th century Indian philosopher

Mahalo

1970



Oct, 2023



*Tell your friend that in his death,
a part of you dies and goes with him.
Wherever he goes, you also go.
He will not be alone.*

- Jiddu Krishnamurthi

