

Julio C. de Paula

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BIOGRAPHICAL SUMMARY

Education

- Ph.D. in Chemistry, Yale University (1987)
Thesis Advisor: Prof. Gary W. Brudvig
Dissertation: Structure of the Multinuclear Manganese Complex of Photosystem II
- B.A. with Highest Honors, Rutgers, The State University of New Jersey (1982)
Major: Chemistry *Minor:* German
- Foreign languages: fluency in Portuguese; reading proficiency in Spanish, French, and German

Employment history

- 2010-present Professor of Chemistry and Associate Vice President & Director of Special Projects, Lewis & Clark College, Portland, OR.
- 2005-2010 Dean of the College of Arts & Sciences and Professor of Chemistry, Lewis & Clark College, Portland, OR.
- Spring 2005 Knapp Visiting Distinguished Professor of Liberal Arts, Department of Chemistry, University of San Diego, San Diego, CA.
- 2001-2005 Professor of Chemistry, Haverford College, Haverford, PA.
- 1995-2001 Associate Professor of Chemistry, Haverford College, Haverford, PA.
- 1989-1995 Assistant Professor of Chemistry, Haverford College, Haverford, PA.
- 1987-1989 NIH Postdoctoral Fellow, Michigan State University (with Gerald T. Babcock).
- Summer 1982 Research Assistant, Allied Chemical, Morristown, NJ.
- Summer 1981 Undergraduate research assistant, Department of Chemistry, Rutgers University.

Honors and awards

- Knapp Visiting Distinguished Professor of Liberal Arts, University of San Diego (2005)
- Henry Dreyfus Teacher-Scholar Award (1998-2003)
- Christian and Mary Lindback Award for Distinguished Teaching (1995)
- National Institutes of Health Postdoctoral Fellowship (1988-1989)
- Kent Fellowship, awarded by Yale University (1982-1986)
- American Institute of Chemists Undergraduate Award (1982)
- Henry Rutgers Undergraduate Scholar Award (1982)
- A.C.S. Undergraduate Analytical Chemistry Award (1981)
- Phi Beta Kappa (1981-present; elected as a junior at Rutgers, The State University of New Jersey)
- Delta Phi Alpha, the National German Honorary Society (1981-present)

Professional organizations

American Chemical Society

Council on Undergraduate Research

ADMINISTRATIVE EXPERIENCE

Lewis & Clark College

Associate Vice President & Director of Special Projects (2010-present)

- Fund-raising portfolio with an emphasis on enhancement of academic programs.
- Direction of academic projects associated with large grants and gifts.

Dean of the College of Arts & Sciences (2005-2010)

- Chief Academic Officer of Lewis & Clark's College of Arts & Sciences reporting directly to the President, charged with joint oversight of an annual budget of approximately \$68 million and supervision of:
 - eighteen academic departments and seven interdisciplinary programs,
 - the Office of the Associate Dean,
 - the Aubrey R. Watzek Library,
 - the Office of the Registrar,
 - the Center for Career and Community Engagement,
 - the Overseas & Off-campus Programs Office,
 - the Office of Summer Sessions,
 - the Office of Academic Advising,
 - the Office of Assessment,
 - the Faculty Development Program, and
 - the Office of Sponsored Research.
- Administrative accomplishments to date:
 - Reorganization of faculty governance, with the establishment of an elected Faculty Council that advises the Dean on matters that affect the academic and financial welfare of the College.
 - Reorganization of administrative structure, with the establishment of the Office of the Associate Dean and the Office of Assessment.
 - Establishment of the Faculty Development Program.
 - Establishment of the Office of Academic Advising and, together with the Dean of Students, the Center for Career and Community Engagement, with the goal of providing academic and career advice to students at all levels of development.
 - Enhancement of undergraduate research programs in the arts, humanities, social sciences, and natural sciences.
 - Planning for a new Integrated Mathematical & Natural Sciences Center and a new Performing Arts Center.
 - Enhancement of faculty hiring and salary policies.
 - Hiring of twenty-eight tenure-track faculty members (in eighteen disciplines) and three directors (Physical Education & Athletics, Summer Sessions, and Career and Community Engagement).
 - Four consecutive years of significant salary raises for faculty and staff aimed at reducing the gap in compensation between Lewis & Clark and peer institutions.
- Fund-raising accomplishments to date:
 - A gift of \$100,000 from a trustee to enhance undergraduate research opportunities in the biomedical sciences.
 - A grant of \$225,000 from the Sherman Fairchild Foundation to enhance undergraduate research opportunities in biology, biochemistry, chemistry, computer science, mathematics, physics, and psychology.
 - A grant of \$450,000 from the Andrew W. Mellon Foundation to establish a program for teaching postdoctoral fellows in the humanities and humanistic social sciences.

- A grant of \$800,000 from the Andrew W. Mellon Foundation to enhance a faculty development program in the humanities and humanistic social sciences.
- A grant of \$77,200 from the Arnold and Mabel Beckman Foundation to support undergraduate research in chemistry and the biological sciences.
- A grant of \$1,300,000 from the Howard Hughes Medical Institute Undergraduate Science Education Program to establish a K-12 outreach initiative in science education and to enhance curricular offerings in neuroscience, bioinformatics, and biophysics.
- A grant of \$250,000 from the W.M Keck Foundation for the development of a nanoscience curriculum.
- A gift of \$5,000,000 from an anonymous source to promote the mathematical and natural sciences at Lewis & Clark College.

Haverford College

- Department and Program Administration:
 - Member, Integrated Learning Council (2003-2005).
 - Member (1992-1995, 1997-2005) and Coordinator (1995-1996), Committee on the Concentration in Biochemistry and Biophysics.
 - Member, Coordinating Committee of the Hughes Scholars Program (1990-1994, 1998-1999, 2004-2005).
 - Chair, Department of Chemistry (1997-2000).
- Marian E. Koshland Integrated Natural Sciences Center:
 - Director (2003-2005).
 - Faculty Liaison to the Construction Management Group (2000-2002).
 - Member, Steering and Executive Committees charged with the planning and design of the Integrated Natural Science Center at Haverford College (1997-2002).
- Fund-raising:
 - Member, Integrated Natural Sciences Initiative Committee (2000-2002).
 - Co-writer or head writer of proposals to the Howard Hughes Medical Institutes Undergraduate Science Education Program, Kresge Foundation, Zimmer Corporation, and W. M. Keck Foundation that resulted in grants totaling \$5,050,000.
- Budgeting:
 - Chair, Administrative Advisory Committee (2002-2004).
 - Member, Administrative Advisory Committee (2001-2002).
- Other Committees (abbreviated list):
 - Alternate Natural Science Division Representative to Academic Council (2003-2004).
 - Member, Study Abroad Committee (1998-1999).
 - Member, Committee on Hazardous Chemicals (1994-1995).
 - Member, College Honors Committee (1994-1995).
 - Member, Educational Policy Committee (1991-1992).
 - Member, Radiation Safety Committee (1990-1991).

Societies and Foundations

- Consultant, Camille & Henry Dreyfus Foundation (2006-2008).
- Member, Scientific Foundations for Future Physicians Committee, Association of American Medical Colleges and Howard Hughes Medical Institute (2007-2009).
- Visiting Associate, Committee on Professional Training of the American Chemical Society (2002-2005).
- National Science Foundation:

- Member, Advisory Committee, GPRA Performance Assessment (2006-2008).
- Member, Advisory Committee, Office of International Science and Engineering (2003-2008).
- Council on Undergraduate Research:
 - Councilor, Chemistry Division (1999-2008; 2010-2013).
 - Member, Strategic Planning Committee (2001-2002).
- International Union of Pure and Applied Chemistry:
 - Member, Strategic Plan Development Committee (2001).
 - Member, Educational Strategy Development Committee (2000).
 - Young observer, US National Committee, 40th General Assembly of the International Union of Pure and Applied Chemistry (1999).

Conference organization

- Workshop Organizer, Establishing and Nurturing Research Collaborations, Conference of the Council on Undergraduate Research, New London, CT (June 2002).
- Workshop Organizer, Planning and Designing Science Facilities, Conference of the Council on Undergraduate Research, New London, CT (June 2002).
- Conference Organizer, 11th Eastern Regional Photosynthesis Conference, Woods Hole, MA (March 1994).
- Symposium Co-Organizer, Lasers in the Undergraduate Curriculum, 13th Biennial Conference on Chemical Education, Bucknell University, Lewisburg, PA (August 1994).
- Session Chair, Symposium on Undergraduate Physical Chemistry Laboratory Development - Computer Interfacing and Simulation, 4th Chemical Congress of North America and 202nd ACS National Meeting, New York, NY (August 1991).

TEACHING EXPERIENCE

- *General Chemistry*: General Chemistry and Advanced General Chemistry.
- *Physical Chemistry*: Physical Chemistry I and Physical Chemistry II.
- *Advanced Laboratory Course*: Laboratory in Chemical Structure and Reactivity.
- *Biological Chemistry*: Topics in Biophysical Chemistry, Enzyme Reaction Mechanisms, Bioinorganic Chemistry.
- *Advanced Seminars*: Interdisciplinary Examinations of Biologically Significant Research, Nanotechnology and Biomachines.
- *Writing*: Light and the Colors of Life, a writing seminar for first-year students.

RESEARCH ACTIVITIES

Recent accomplishments

- Characterization by scanning probe microscopy and electrical conductivity measurements of self-assembled porphyrin nanowires.
- Determination of the spectroscopic properties of a new molecular nanowire that self-assembles from porphyrin-peptide building blocks.
- Determination by light scattering, circular dichroism, and resonance Raman spectroscopy of the mechanism of assembly of chlorophyll aggregates and metalloporphyrin-DNA complexes.
- Development of two spectroscopic techniques for probing nanoscopic and mesoscopic materials: resonance Rayleigh light scattering and aggregation-enhanced resonance Raman spectroscopy.

- Determination of the spectroscopic and photochemical properties of halogenated metalloporphyrins that are rationally designed for photodynamic therapy of tumors.
- Characterization by flash photolysis and time-resolved resonance Raman spectroscopy of excited electronic states of metalloporphyrins that are designed for photonic applications.
- Determination by time-resolved fluorescence and resonance Raman spectroscopy of the mechanism of energy transfer in a 47 kDa light-harvesting protein associated with plant photosynthesis.
- Characterization by resonance Raman spectroscopy of intermediates in electron transfer reactions associated with oxygenic photosynthesis.
- Direct measurement of manganese levels in healthy and diseased snapbean leaves by electron paramagnetic resonance spectroscopy.

Grant support (1989-2013)

Note: The total amount of support, including single-investigator and collaborative grants, is \$3,221,564.

- Nanoscience Program Development (with Profs. K. Autumn and A. Bentley, Lewis & Clark College), W.M. Keck Foundation, \$250,000, 1/10-1/13.
- Acquisition of an LC/MS System to Support the Integrated Teaching and Research Program at Haverford College (with Profs. F. Blase, K. Åkerfeldt, R. Scarrow, and T. Newirth, Haverford College), National Science Foundation, \$235,953, 8/04-7/07.
- Undergraduate Research Center Planning Grant: Consortium for Research Opportunities in Plant Sciences (with Profs. H.D. Husic, Lafayette College, D. Husic, East Stroudsburg University, R. Rowlett, Colgate University, R. Reed, Juniata College, E. Woolridge, Marist College, and M. Kuchka, Lehigh University), National Science Foundation, \$50,000, 8/04-8/06.
- Establishment of a Consortium for Educational and Research Opportunities in the Chemical and Molecular Aspects of Plant Science (with Profs. H.D. Husic, Lafayette College, D. Husic, East Stroudsburg University, R. Rowlett, Colgate University, R. Reed, Juniata College, E. Woolridge, Marist College, and M. Kuchka, Lehigh University), Camille & Henry Dreyfus Foundation, Special Grant Program in the Chemical Sciences, \$15,000, 1/04-1/05.
- Protein-based Biomaterials for Nanotechnology (with Profs. R. Fairman, R. Manning, K. Åkerfeldt, K. Johnson, S. Amador-Kane, and W. Smith, Haverford College), David and Lucille Packard Foundation, \$966,020, 7/00-06/05.
- Advanced Microscopy and Manipulation Instrument Cluster for Biological and Biophysical Studies (with Profs. W. Smith, R. Fairman, J. Punt, S. Amador Kane, and K. Johnson, Haverford College), National Science Foundation, \$169,271, 7/00-7/01.
- RUI: Structure and Assembly Kinetics of Supramolecular Assemblies (with Profs. R. Pasternack, Swarthmore College, P. Collings, Swarthmore College, and E. Gibbs, Goucher College), National Science Foundation, \$480,000, 7/99-9/03.
- Henry Dreyfus Teacher-Scholar Award, Camille & Henry Dreyfus Foundation, \$60,000, 10/98-10/03.
- RUI: Acquisition of a Circular Dichroism Spectropolarimeter (with Profs. R. Fairman, K. Åkerfeldt, Haverford College, and S. White, Bryn Mawr College), National Science Foundation, \$56,000, 11/99-10/00.
- RUI: Time-Resolved Resonance Raman Spectroscopy of Metalloporphyrins in Excited Electronic States, National Science Foundation, \$132,660, 8/96-7/99.
- CRUI: Resonance Light Scattering and the Study of Synthetic and Biological Light-Harvesting Systems (with Profs. R. Pasternack, Swarthmore College, P. Collings, Swarthmore College, and E. Gibbs, Goucher College), National Science Foundation, \$510,400, 8/95-10/98.

- Energy Transfer in Plant Photosynthesis, American Chemical Society Petroleum Research Fund (Type B), \$25,000, 1/93-8/95.
- Electron Transfer in Plant Photosynthesis, Research Corporation/Cottrell College Science Grants Program. \$53,000, 11/90-11/95.
- A 300 MHz NMR Spectrometer for Undergraduate Education and Research, Camille & Henry Dreyfus Foundation, Special Grant Program in the Chemical Sciences, \$25,000, 9/92-9/93.
- Purchase of a 300 MHz NMR Spectrometer (with Profs. C. Wintner, R. Scarrow, and F. Blase, Haverford College), National Science Foundation, Chemistry Research Instrumentation Program, \$150,000, 3/92-8/93.
- Time-Resolved Resonance Raman Spectroscopic Measurements of Excited Electronic States in Materials (with Profs. V. Walters, Lafayette College, and M. Shinn, Bryn Mawr College), Pew Science Program in Undergraduate Education - Mid-Atlantic Cluster. \$6,260, 5/91-5/92.
- Solvent and Substituent Effects on Excited State Properties of Zinc(II) Tetraphenylporphyrins (with Profs. V. Walters and C. Nutaitis, Lafayette College), Pew Science Program in Undergraduate Education - Mid-Atlantic Cluster. \$10,000, 2/90-2/91.
- Structure of Plant Photosynthetic Reaction Centers, American Chemical Society Petroleum Research Fund, Type G (Starter). \$18,000, 5/90-5/92.
- Resonance Raman Spectroscopy of Metalloporphyrins and Chlorophyll-Binding Proteins (with Prof. V. Walters, Lafayette College), Pew Science Program in Undergraduate Education - Mid-Atlantic Cluster. \$9,000, 5/89-5/90.

Editorial Board

- Member of the Advisory Editorial Board, Optics Communications (1994-2000).

Manuscript, book, and proposal review

- Reviewer of manuscripts for: The Proceedings of the National Academy of Sciences, The Journal of the American Chemical Society, The Journal of Chemical Education, Biochemistry, Biochimica et Biophysica Acta, Biophysical Journal, Chemical Communications, Inorganic Chemistry, The Journal of Physical Chemistry, The Journal of Photochemistry and Photobiology, The Journal of Porphyrins and Phthalocyanines, Optics Communications, Physical Review, The Journal of Luminescence, Talanta, Proceedings of the National Academy of Sciences U.S.A., Microchimica Acta, Nanoletters.
- Reviewer of the text *A Guide to Lasers in Chemistry* by G.R. Van Hecke and K.K. Karukstis, Jones and Bartlett Publishers, Boston (1998).
- Member of Review Panels at the National Science Foundation: Major Research Instrumentation Program, Graduate Fellowships Program, Research on Learning and Education Program, Research Experiences for Undergraduates Program.
- Reviewer for the U.S. Department of Agriculture, U.S. Department of Energy, National Science Foundation, ACS Petroleum Research Fund, Research Corporation, Civilian Research and Development Foundation for the Independent States of the Former Soviet Union, Arnold and Mabel Beckman Foundation, Merck/AAAS Undergraduate Science Research Program.

INVITED LECTURES (Revised on July 1, 2010)

Photobiology, photochemistry, spectroscopy, and nanoscience

- From Plant Biochemistry to Green Energy and Nanotechnology: Molecular Photonics with Porphyrins. Appalachian State University, Boone, NC (2008).

- From Plant Biology to Nanoscience: Molecular Electronics with Porphyrins. Oregon Graduate Institute, Beaverton, OR (2006).
- What's the Big Fuss about Nanotechnology? University of San Diego, San Diego, CA (2005).
- From Plant Biology to Nanoscience: Molecular Electronics with Porphyrins. University of San Diego, Department of Chemistry, San Diego, CA (2005).
- What's the Big Fuss about Nanotechnology? Mechanics' Institute, San Francisco, CA (2005).
- From Plant Biology to Nanoscience: Molecular Electronics with Porphyrins. Juniata College, Department of Chemistry, Huntingdon, PA (2004).
- From Plant Biology to Nanoscience: Molecular Electronics with Porphyrins. Temple University, Department of Chemistry, Philadelphia, PA (2004).
- From Plant Biology to Nanoscience: Molecular Electronics with Porphyrins. University of Richmond, Department of Chemistry, Richmond, VA (2004).
- Molecular Photonics with Porphyrins. Yale University, Department of Chemistry, New Haven, CT (2004).
- Molecular Photonics with Porphyrins. Drexel University, Department of Chemical Engineering, Philadelphia, PA (2004).
- From Biology to Nanoscience: Molecular Electronics with Porphyrins. Mount Holyoke College, Department of Chemistry, South Hadley, MA (2003).
- How Can We Capture the Sun's Energy? University of North Carolina at Asheville, Department of Chemistry, Asheville, NC (2001).
- Light-Harvesting Supramolecules. Michigan State University, Department of Chemistry, East Lansing, MI (2001).
- Light-Harvesting Supramolecules. University of Pennsylvania, Department of Chemistry, Philadelphia, PA (2001).
- Light-Harvesting Supramolecules. Villanova University, Department of Chemistry, Villanova, PA (2000).
- Supramolecular Photochemistry: How Can We Capture the Sun's Energy? New College of the University of South Florida, Division of Natural Sciences, Sarasota, FL (2000).
- Resonance Light Scattering Spectroscopy: A New Tool for Biochemists. Lycoming College, Department of Chemistry, Williamsport, PA (1999).
- Resonance Light Scattering Spectroscopy: New Probe of Light-Harvesting Systems. East Stroudsburg University, Department of Chemistry, East Stroudsburg, PA (1998).
- Resonance Light Scattering Spectroscopy: A New Probe of Supramolecular Assemblies. Hamilton College, Department of Chemistry, Clinton, NY (1997).
- Resonance Light Scattering Spectroscopy: A New Probe of Light Harvesting Systems. University of North Carolina, Department of Chemistry, Greensboro, North Carolina (1997).
- Resonance Light Scattering Spectroscopy: A New Probe of Supramolecular Systems. Yale University, Department of Chemistry, New Haven, Connecticut (1996).
- Resonance Light Scattering Spectroscopy of Chlorophyll Aggregates and Light-Harvesting Complexes. Plenary Lecture, 13th Eastern Regional Photosynthesis Conference, Woods Hole, Massachusetts (1996).
- Raman Spectroscopy: Principles and Some Biochemical Applications. University of Pennsylvania, Department of Biochemistry and Biophysics, Philadelphia, Pennsylvania (1996).
- Resonance Light Scattering Spectroscopy: A New Probe of Chlorophyll Aggregates and Light-Harvesting Systems. Columbia University, Department of Biochemistry and Molecular Biophysics, New York, New York (1996).
- Energy Transfer in Plant Photosynthesis. University of Massachusetts, Department of Chemistry, Amherst, Massachusetts (1993).

- EPR Studies of Manganese-Binding Proteins. U.S. Department of Agriculture, Agricultural Research Station, Beltsville, Maryland (1993).
- Energy Transfer in Plant Photosynthesis. Swarthmore College, Department of Chemistry, Swarthmore, Pennsylvania (1993).
- Energy Transfer in Plant Photosynthesis. Drexel University, Department of Chemistry, Philadelphia, Pennsylvania (1992).
- Electron Transfer in Plant Photosynthesis. Sigma Xi Lecture, Lafayette College, Easton, Pennsylvania (1991).
- Spectroscopic Studies of Electron Transfer in Photosynthesis. Bryn Mawr College, Department of Chemistry, Bryn Mawr, Pennsylvania (1990).

Science education

- Preparing Undergraduates for Interdisciplinary Research in the Molecular Sciences. 41st Western Regional Meeting of the American Chemical Society, San Diego, CA (2007).
- Career Trajectories at Liberal Arts Colleges. 41st Western Regional Meeting of the American Chemical Society, San Diego, CA (2007).
- Enhancing an Institutional Research Environment. 233rd National Meeting of the American Chemical Society, Chicago, IL (2007).
- Enhancing an Institutional Research Environment. 229th National Meeting of the American Chemical Society, San Diego, CA (2005).
- Enhancing an Institutional Research Environment. Tenth Annual Conference of the Council on Undergraduate Research, La Crosse, WI (2004).
- Partnerships: The Haverford Experience. Tenth Annual Conference of the Council on Undergraduate Research, La Crosse, WI (2004).
- Integrating the Sciences at Haverford College: The Role of Collaborations Between Teacher-Scholars. 227th National Meeting of the American Chemical Society, Anaheim, CA (2004).
- Integrating the Sciences at Primarily Undergraduate Institutions. Convocation on Facilitating Interdisciplinary Research, The National Academies, Washington, DC (2004).
- The Role of Collaboration in Undergraduate Research. Gordon Research Conference on Chemistry Education: Research & Practice, Ventura, CA (2004).
- Teaching Biological Spectroscopy through Research. 226th National Meeting of the American Chemical Society, New York, NY (2003).
- Establishing and Nurturing Research Collaborations: Challenges and Rewards. 223rd National Meeting of the American Chemical Society, Orlando, FL (2002).
- Teaching Undergraduates through Research: Challenges and Rewards. Symposium on Envisioning the Chemical Sciences: Perspectives from Camille & Henry Dreyfus Awardees, 220th National Meeting of the American Chemical Society, Washington, DC (2000).

PUBLICATIONS (Revised on July 1, 2010)

Note: Asterisks denote undergraduate co-authors from Haverford College, Bryn Mawr College, Swarthmore College, Lafayette College, or Goucher College.

Research articles

1. Magnetic Properties of Manganese in the Photosynthetic O₂-Evolving Complex, J.C. de Paula and G.W. Brudvig, *Journal of the American Chemical Society* **107**, 2643-2648 (1985).

2. Active and Resting States of the O₂-Evolving Complex of Photosystem II, W.F. Beck, J.C. de Paula, and G.W. Brudvig, *Biochemistry* **24**, 3035-3043 (1985).
3. Electron Transfer in Photosystem II at Cryogenic Temperatures, J.C. de Paula, J.B. Innes, and G.W. Brudvig, *Biochemistry* **24**, 8114-8120 (1985).
4. Magnetic Properties of Manganese in the Photosynthetic O₂-Evolving Complex. 2. Evidence for a Manganese Tetramer, J.C. de Paula, W.F. Beck, and G.W. Brudvig, *Journal of the American Chemical Society* **108**, 4002-4009 (1986).
5. Ammonia Binds to the Manganese Site of the O₂-Evolving Complex of Photosystem II in the S₂ State, W.F. Beck, J.C. de Paula, and G.W. Brudvig, *Journal of the American Chemical Society* **108**, 4018-4022 (1986).
6. Effect of the 17- and 23-Kilodalton Polypeptides, Calcium, and Chloride on Electron Transfer in Photosystem II, J.C. de Paula, P.M. Li, A.-F. Miller, B.W. Wu, and G.W. Brudvig, *Biochemistry* **25**, 6487-6494 (1986).
7. Formation of the S₂ State and Structure of the Mn Complex in Photosystem II Lacking the Extrinsic 33 Kilodalton Polypeptide, A.-F. Miller, J.C. de Paula, and G.W. Brudvig, *Photosynthesis Research* **11**, 205-218 (1987).
8. Studies of the Manganese Site of Photosystem II by Electron Paramagnetic Resonance Spectroscopy, J.C. de Paula, W.F. Beck, A.-F. Miller, R.B. Wilson, and G.W. Brudvig, *Journal of the Chemical Society (Faraday Transactions)* **83**, 3635-3651 (1987).
9. Electron Donation in Photosystem II, L.K. Thompson, A.-F. Miller, J. C. de Paula, and G.W. Brudvig, *Israel Journal of Chemistry* **28**, 121-128 (1988).
10. Isolation and Characterization of the 47 kDa Protein and the D1, D2, Cytochrome b-559 Complex, D.F. Ghanotakis, J.C. de Paula, D.M. Demetriou, N.R. Bowlby, J. Petersen, G.T. Babcock, and C.F. Yocum, *Biochimica et Biophysica Acta* **974**, 44-53 (1989).
11. Resonance Raman Spectrum of the Lowest Triplet State of Zn(II) Tetraphenylporphyrin, V.A. Walters, J.C. de Paula, G.T. Babcock, and G.E. Leroi, *Journal of the American Chemical Society* **28**, 8300-8302 (1989).
12. Characterization of the Multiple Forms of Cytochrome b-559 in Photosystem II, L.K. Thompson, A.-F. Miller, J.C. de Paula, and G.W. Brudvig, *Biochemistry* **28**, 8048-8056 (1989).
13. Hemes *a* and *a*₃ Environments of Plant Cytochrome *c* Oxidase, J.C. de Paula, W.E. Peiffer, R.T. Ingle, J.A. Centeno, S. Ferguson-Miller, and G.T. Babcock, *Biochemistry* **29**, 8702-8706 (1990).
14. Transient Resonance Raman Spectrum of *meso*-Tetraphenylporphine: An Analysis of the Chemical Factors that Influence the Dynamics of the Excited Triplet States of Metalloporphyrins, J.C. de Paula, V.A. Walters, K. Hall,* J. Lind,* and C. Nutaitis, *Journal of Physical Chemistry* **96**, 10591-10594 (1992).
15. Structure-Function Relationships in the 47 kDa Antenna Protein and its Complex with the Reaction Center Core of Photosystem II: Insights from Resonance Raman Spectroscopy and Picosecond Fluorescence Decay Kinetics, J.C. de Paula, A. Liefshitz,* S. Hinsley,* W. Lin,* V. Chopra,* K. Long,* S.A. Williams, S. Betts, and C.F. Yocum, *Biochemistry* **33**, 1455-1466 (1994).
16. Electronic Structure of Triplet States of Zinc(II) Tetraphenylporphyrins, V.A. Walters, J.C. de Paula, B. Jackson,* C. Nutaitis, K. Hall,* J. Lind,* K. Cardozo,* K. Chandran,* D. Raible,* and C.M. Philips, *Journal of Physical Chemistry* **99**, 1166-1171 (1995).
17. Aggregation of Chlorophyll *a* Probed by Resonance Light Scattering Spectroscopy, J.C. de Paula, J.H. Robblee,* and R.F. Pasternack, *Biophysical Journal* **68**, 335-341 (1995).
18. Transient Resonance Raman Spectroscopy of Copper(II) Complexes of *meso*-Tetraphenylporphine and *meso*-Tetraphenylchlorin, J.C. de Paula, V.A. Walters, B.A. Jackson,* and K. Cardozo,* *Journal of Physical Chemistry* **99**, 4373-4379 (1995).
19. Synthesis, Transient Absorption, and Transient Resonance Raman Spectroscopy of Novel Electron Donor-Acceptor Complexes: [5,15-bis[(4'-nitrophenyl)ethynyl]-10,20-diphenyl-porphinato]- and [5-[[4'-(dimethylamino)phenyl]ethynyl]-15-[(4-nitrophenyl)ethynyl]-10,20-diphenylporphinato]copper(II), S.M.

- LeCours, C.M. Philips, J.C. de Paula, and M.J. Therien, *Journal of the American Chemical Society* **119**, 12578-12589 (1997).
20. Depolarized Resonance Light Scattering by Porphyrin and Chlorophyll *a* Aggregates, J. Parkash, J.H. Robblee,* J. Agnew,* P. Collings, E. Gibbs, R.F. Pasternack, and J.C. de Paula, *Biophysical Journal* **74**, 2089-2099 (1998).
 21. A Non-Conventional Approach to Supramolecular Formation Dynamics. The Kinetics of Assembly of DNA-Bound Porphyrins, R.F. Pasternack, E.J. Gibbs, P.J. Collings, J.C. de Paula, L.C. Turzo,* and A. Terracina,* *Journal of the American Chemical Society* **120**, 5873-5878 (1998).
 22. Electron Paramagnetic Resonance Studies of Manganese Toxicity, Tolerance, and Amelioration with Silicon in Snapbean, E.I. Jücker, C.D. Foy, J.C. de Paula, and J. Centeno, *Journal of Plant Nutrition* **22**, 769-782 (1999).
 23. Low-Temperature Optical and Resonance Raman Spectra of a Carotenoid Cation Radical in Photosystem II, J.S. Vrettos, D.H. Stewart, J.C. de Paula, and G.W. Brudvig, *Journal of Physical Chemistry B* **103**, 6403-6406 (1999).
 24. Aggregation Kinetics of Extended Porphyrin and Cyanine Dye Assemblies, R.F. Pasternack, C. Fleming,* S. Herring,* P.J. Collings, J.C. de Paula, G. DeCastro,* and E.J. Gibbs, *Biophysical Journal* **79**, 550-560 (2000).
 25. Characterization of the O₂-Evolving Reaction Catalyzed by [(terpy)₂](H₂O)Mn^{III}(O)₂Mn^{IV}(OH₂(terpy))](NO₃)₃ (terpy = 2,2':6,2-terpyridine), J. Limburg, J.S. Vrettos, H. Chen, J.C. de Paula, R.H. Crabtree, and G.W. Brudvig, *Journal of the American Chemical Society* **123**, 423-430 (2001).
 26. High-frequency EPR Study of a New Mononuclear Manganese(III) Complex: [(terpy)Mn(N₃)₃] (terpy = 2,2':6',2-Terpyridine), J. Limburg, J.S. Vrettos, R.H. Crabtree, G.W. Brudvig, J. C. de Paula, A. Hassan, A.-L. Barra, C. Duboc-Toia, and M.-N. Collomb, *Inorganic Chemistry* **40**, 1698-1703 (2001).
 27. Interactions of Copper(II) Porphyrins with DNA, R.F. Pasternack, E.J. Gibbs, P.J. Collings, J.C. de Paula, S. Ewen,* A. Rao,* A.S. Meyer,* M.A. Freedman,* M. Ranen,* and S. Frey,* *Inorganica Chimica Acta* **317**, 59-71 (2001).
 28. Factors that Determine the Unusually Low Reduction Potential of Cytochrome *c*₅₅₀ in Cyanobacterial Photosystem II, J.S. Vrettos, M.J. Reifler, O. Kievit, K.V. Lakshmi, J.C. de Paula, and G.W. Brudvig, *Journal of Biological Inorganic Chemistry* **6**, 708-716 (2001).
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