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Curriculum Vitae December 2013

Linda E. Graham, Professor

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US citizen

Education:

• B.A.	Botany	Washington University, St. Louis, MO	1967
• M.A.	Botany	University of Texas, Austin, TX	1969
• Ph.D.	Botany	University of Michigan, Ann Arbor, MI	1975
• Postdoctoral Researcher		University of Michigan	1975-6

Academic Positions (teaching, research, and related service):

• Lecturer in Biology	Eastern Michigan University	1976
• Assistant Professor of Botany	University of Wisconsin, Madison, WI	1976
• Associate Professor of Botany	University of Wisconsin	1982
• Professor of Botany	University of Wisconsin	1987-present

Elected Administrative Positions:

- Chair, Department of Botany (College of Letters & Science) 1988-91
- Chair, Limnology and Marine Sciences Graduate Program (College of Engineering) two terms: 1994-97; 2005-8
- Chair, Water Resources Management Graduate Program (Gaylord Nelson Institute for Environmental Studies) 2004-2007

Appointed Administrative Positions:

- Interim Co-director, Institute for Cross-College Biology Education (College of Agriculture and Life Sciences) 2008
- Co-director, Women in Science and Engineering Residential Program (CALS) 2009-11

University Service, past 8 years:

- University Committee (UC), 1-year Faculty Senate appointed term
- UC representative on the University Academic Planning Council (UAPC) (2011-2)
- Chaired UAPC working group tasked with recommending revisions to "Guidelines for Suspending Admissions or Discontinuing Degree and Major Programs"
- Chaired a 2011 UC-appointed working team tasked with providing guidance to the UC and PROFS regarding governance issues arising from activities of the State Legislature and state agencies, particularly the Legislative Special Task Force on UW Restructuring and Operational Flexibilities
- Service to CALS as member of Department of Plant Pathology Program Review team (2011) and review of the Biometry graduate program
- Director or Co-Director of the Women in Science and Engineering (WISE) Residential Program (2009-2011).
- Provost's ad hoc Cluster Hire Advisory Committee (2010).
- CALS Biometry Graduate Program Review Committee (2009)
- University Committee (elected term) 2006-2009
- PROFS treasurer (2006-2009)
- UW-Madison campus representative to a multi-campus working group on multidisciplinarity (2009)
- Committee on Committees, as representative of the University Committee
- Committee on Committees, elected term of service 2004-6), Chair in 2005
- GNIES Director Search and Screen Committee member (2007)
- Officer Education Committee member (committee oversees campus ROTC programs) (2005-7).

Other Past University Service:

- Chair, Campus Transportation Committee
- Chair, Biological Sciences Divisional Committee
- Two elected terms of service on L&S Academic Planning Council
- L&S Program review team member: Departments of Math and Statistics
- A past CALS Dean search and screen committee
- Academic Staff Area Review Committee
- Union Council
- University Press Committee

Professional Affiliations & Elected Offices:

- Botanical Society of America, President 2003-4, currently Director-at-large for Development
- Phycological Society of America, Program Director 1991-4, 2013 President
- American Society for Plant Biology
- American Bryological & Lichenological Society
- American Society for Limnology & Oceanography
- American Association for the Advancement of Science
- American Chemical Society
- Geological Society of America

Recent Honors & Awards:

- American Association for the Advancement of Science (AAAS) Fellow, 2003
- Botanical Society of America Centennial Award for exemplary service to the plant sciences, 2006

Teaching Experience:

Botany 100, Survey of Botany, breadth for non-majors (current)
Biology 151/2, Biology, introductory for biology majors (past)
Botany 330, Algae, intermediate/advanced, Communications B, field, lab course (current)
Botany 360, Bryophytes intermediate/advanced, field, lab course (past)
Botany 630, Marine Botany advanced field course (past)
Botany 691, 699 Senior Thesis or Independent Research
Botany 911, Seminar, Freshwater and Marine Science
Botany 990, Seminar, Phycology

Research Interests:

Biology of algae and bryophytes with emphasis on microbial associations
Freshwater microbial ecology, with an emphasis on symbiotic associations
Technological applications of algae and bryophytes
Evolutionary diversification of protists and plastids
Origin and early diversification of land plants

Research Support:

8 multi-year National Science Foundation grants, and grants from other sources.

Current:

PI NSF DEB 1119944 2011-2014 $375,000 Microbiomes of charophycean algae: Revealing the early evolution of land plant microbial associations.

Co-PI National Oceanic and Atmospheric Agency 2013-2015 $190,521 Algal bioremediation of wastewater inputs to Great Lakes ecosystems.

PI AlgaeSystems Industrial Contract 2012-2014 $207,360 Algal biofuels research.

Graduate Students:

Ph.D.s Supervised or Co-Supervised:

Professor Patricia Avila-Arancibia, Universidad del Bió-Bió, Chillan, Chile
Associate Professor Emeritus James Hoffman, University of Vermont
Professor Charles Delwiche, University of Maryland
Associate Professor Martha Cook, Illinois State University
Associate Professor David Hanson, University of New Mexico (Co-supervisor)
Assistant Professor (equivalent) Shahrizim bin Zulkifly, Universiti Putra Malaysia, Selangor, Malaysia
Assistant Professor Stuart Jones, Notre Dame University (Co-supervisor)
Dr. Lee Wilcox, University of Wisconsin
Dr. James Kranzfelder, Dow Agrosciences LLC, Indianapolis, IN
Dr. Madeline Fisher
Dr. Eunsoo Kim, New York Museum of Natural History
Dr. Evan Lau, West Liberty University, West Virginia
Dr. Christopher Cardona-Correa, University of Puerto Rico, Ponce

Past Master's students: Wesley Ebert, Alice Ecker, Benjamin Smith

Current Ph.D. students: Anchittha Satjarak, Botany
Current Master's students: Michael Piotrowski, Botany; Michael Braus, GNIES

Publications:

Books:

Brooker, R, Widmaier, E, Graham, L, & Stiling, P. 1e2014 *Principles of Biology* McGraw-Hill, Dubuque, IA.

Brooker, R, Widmaier, E, Graham, L, & Stiling, P 1e2008, 2e2010, 3e2013 *Biology* McGraw-Hill, Dubuque, IA.

Graham, LE, Graham, JM, & Wilcox, LW 1e 2003, *Plant Biology* Prentice Hall, Upper Saddle River, NJ 670 pp; 2e 2006 Benjamin Cummings/Pearson San Francisco.

Graham, LE & Wilcox, LW. *Algae*. 1e 2000, Prentice Hall, Upper Saddle River, NJ 640 pp., 2e 2009 Benjamin Cummings/Pearson, San Francisco.

Graham, LE. 1993. *The Origin of Land Plants*, Wiley & Sons, NY, NY 287 pp.

Peer-reviewed book chapters:

Graham, LE, Lewis, LA, Taylor, W, Wellman, C & Cook, ME. 2013. Early terrestrialization: transition from algal to bryophyte grade. In: Hanson and Rice (eds.) *Early Photosynthesis in Bryophytes and Early Land Plants*, Series Govindjee & Sharkey (eds) *Advances in Photosynthesis and Respiration*, Springer (Dordecht).

Graham, LE. 1990, 2010. Phylum Chlorophyta, Class Charophyceae, Orders Chlorokybales, Klebsormidiales, Coleochaetales. In: *Handbook of Proctoctists*, Margulis, Chapman, & Corliss, eds., Boston: Jones & Bartlett Publishers.

Graham, LE, Kodner, RG, Fisher, MM, Graham, JM, & Wilcox, LW, and other authors. 2003. Early land plant adaptations to terrestrial stress: A focus on phenolics. In: *Evolution of Plant Physiology*, Hemsley & Poole, eds., New York: Academic Press, pp 155-170.

Graham, LE & Gray J. 2001. The origin, morphology and ecophysiology of early embryophytes: Neontological and palaeontological perspectives. In: Gensel and Edwards, eds. *Plants Invade the Land*. New York: Columbia University Press, pp. 140-156.

Cook, ME & Graham, LE. 1999. Evolution of plasmodesmata. In: *Plasmodesmata: Nanochannels with Megatasks*, van Bel & van Kesteren, eds., Berlin: Springer Verlag, pp. 102-117.

Graham, LE. 1990. Meiospore formation in charophycean algae. In: *Meiospores: Evolution and Ontogeny*, Blackmore & Barnes, eds., New York: Academic Press, pp. 43-53.

Auer, MT, Graham, JM, Graham, LE & Kranzfelder, JA. 1983. Factors regulating the spatial and temporal distribution of *Cladophora* and *Ulothrix* in the Laurentian Great Lakes. In: *Periphyton of Freshwater Ecosystems*, Wetzel, ed., Hague: Dr. W. Junk, Publishers, pp. 135-145.

Peer-reviewed journal articles:

Graham, LE, JJ Knack, MJ Piotrowski, LW Wilcox, ME Cook, CH Wellman, W Taylor, LA Lewis, P Arancibia-Avila. Online 2013, print 2014. Lacustrine *Nostoc* (Nostocales) and associated microbiome generate a new type of modern clotted microbialite. *Journal of Phycology* (in press).

Graham, L, ME Cook, LW Wilcox, JM Graham, W Taylor, CH Wellman, L Lewis. 2013. Resistance of filamentous chlorophycean, ulvophycean, and xanthophycean algae to acetolysis: Testing Proterozoic and Paleozoic microfossil attributions. *International Journal of Plant Sciences* 174:947-957. Doi: 10.1086/670591

Zulkifly, SB, Graham, JM, Young, EB, Mayer, RJ, Piotrowski, MJ, Smith, I & Graham, LE. 2013. The genus *Cladophora* Kützing (Ulvophyceae) as a globally distributed ecological engineer. *Journal of Phycology* 49:1-17. http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291529-8817/accepted.

Zulkifly, S, Hanshew, A, Young, EB, Lee, P, Graham, ME, Graham ME, Piotrowski, M & Graham, LE. The epiphytic microbiota of the globally widespread macroalga *Cladophora glomerata* (Chlorophyta, Cladophorales). 2012. *American Journal of Botany* 99:1541-1552. http://www.ncbi.nlm.nih.gov/pubmed/22947483

Graham, LE, Arancibia-Avila, P, Taylor, WA, Strother, PK, and Cook, ME. 2012. Aeroterrestrial *Coleochaete* (Streptophyta, Coleochaetales) models early plant adaptation to land. *American Journal of Botany* 99: 130-144.

Graham, JM, Graham, LE Zulkifly, SB, Pfleger, BF, Hoover, SW, and Yoshitani, Y. 2011. Freshwater diatoms as a source of lipids for biofuels. *J. Ind. Microbio. Biotechnol.* DOI 10.1007/s10295-011-1041-52.

Hoover, SW, Marner, WD II, Brownson AK, Lennen, RM, Wittkopp, TM, Yoshitani, J, Zulkifly, S, Graham, LE, Chaston, S, McMahon, KD, & Pfleger, BF. 2011. Bacterial production of free fatty acids from freshwater, macroalgal cellulose. *Applied Microbiology and Biotechnology* 91: 435-446.

Graham, LE, E Kim, P. Arancibia-Avila, JM Graham & LW Wilcox. 2010. Evolutionary and ecophysiological significance of sugar utilization by the peatmoss *Sphagnum compactum* (Sphagnaceae) and the common charophycean associates *Cylindrocystis brebissonii* and *Mougeotia* sp. (Zygnemataceae). *American Journal of Botany* 97:1485-1491.

Graham, LE, Cook, ME, Hanson, DT, Pigg, KB & Graham, JM. 2010. Rolled liverwort mats explain major *Prototaxites* features: Response to Commentaries. *American Journal of Botany* 97(7):1079-1086.

Graham, LE, Cook, ME, Hanson, DT, Pigg, KB & Graham, JM. 2010. Structural, physiological, and stable carbon isotopic evidence that the enigmatic Paleozoic fossil *Prototaxites* formed from rolled liverwort mats, *American Journal of Botany* 97 (2):1-8.

Kim, E, N Yubuki, BS Leander, LE Graham. 2009. Episymbioses involving three new gneera of heterotrophic stramenopiles: *Apoikia lindahli* comb. Nov. (Chrysophyceae), *Filos agilis* gen. et sp. nov. (Bicosoecida), and *Nanos amicus* gen. et sp. nov. (Bicoecida). *Protist* doi.1016/jprotis.2009.09.003.

Kim, E. and Graham, LE. 2008. EEF2 analysis challenges the monophyly of Archaeplastida and Chromalveolata. *PloS One* 3:e2621.

Kim, E, Simpson, AGB, & Graham, LE. 2006. Evolutionary relationships of apusomonads inferred from taxon-rich analyses of six nuclear-encoded genes. *Molecular Biology and Evolution* 23:2455-66.

Kim, E, Wilcox, L, Fawley, MW, & Graham, LE. 2006. Phylogenetic position of the green flagellate *Mesostigma viride* based on alpha-tubulin and beta-tubulin gene sequences. *International Journal of Plant Sciences* 167: 873-883.

Graham, LE, Wilcox, LW, Cook, ME, Gensel, PG. 2004. Resistant tissues of marchantioid liverworts resemble enigmatic Early Paleozoic microfossils. *Proceedings of the National Academy of Sciences* 101: 11025-11029.

Kim, E, Wilcox, L, Graham, L & Graham, J. 2004. Genetically distinct populations of *Peridinium limbatum* in neighboring Northern Wisconsin lakes. *Microbial Ecology* 48(4):521-527.

Graham, JM, Kent, AD, Lauster, GH, Yannarell, AC, Graham, LE, Kratz, TK, Triplett, EW. 2004. Seasonal dynamics of phytoplankton and protozoan communities in a northern temperate humic lake: diversity in a dinoflagellate dominated system. *Microbial Ecology*:38(4):528-540.

Graham, LE, and Cook, ME. 2004. Approaches to understanding the origin and early evolution of plant body symmetry and gravity responses. *Gravitational and Space Biology Bulletin* 17(2): 127-132.

Redeker, D, Kodner, R, & Graham, LE. 2002. *Palaeoglomus grayi* from the Ordovician. *Mycotaxon* 84:33-37.

Arancibia-Avila, PA, Coleman, JR, Russin, WA, Graham, JM, & Graham, LE. 2001. Carbonic anhydrase localization in charophycean green algae: Ecological and evolutionary significance. *International Journal of Plant Sciences* 162:127-135.

Kodner, RB & Graham, LE 2001. High-temperature, acid-hydrolyzed remains of *Polytrichum* (Musci, Polytrichaceae) resemble enigmatic Silurian-Devonian tubular microfossils. *American Journal of Botany* 88:462-466.

Redeker, D, Kodner, R, & Graham, LE. 2000. Glomalean fungi from the Ordovician. *Science* 289:1920-1921.

Graham, LE & Wilcox, LW. 2000. The origin of alternation of generations in land plants: A focus on matrotrophy and hexose transport. *Philosophical Transactions of the Royal Society of London B* 335:757-767.

Graham, LE, Cook, ME & Busse, JS. 2000. The origin of plants: Body plan changes contributing to a major evolutionary radiation. *Proceedings of the National Academy of Sciences* 97:4535-4540.

Arancibia-Avila, P, Coleman, JR, Russin, WA, Wilcox, LW & Graham, LE. 2000. Effects of pH on cell morphology and carbonic anhydrase activity and localization in bloom-forming *Mougeotia* (Chlorophyta, Charophyceae). *Canadian Journal of Botany*. 78:1206-1214.

Hanson, DR, Watson, S, Graham, LE & Sharkey, TD. 1999. Evolutionary significance of isoprene emission from mosses. *American Journal of Botany* 86:634-639.

Fisher, MW, Wilcox, LW & Graham, LE. 1998. Molecular characterization of epiphytic bacterial communities on charophycean green algae. *Applied and Environmental Microbiology* 64:4384-4389.

Fisher, MW, Graham, JM & Graham, LE. 1998. Bacterial numbers and activities in two northern Wisconsin *Sphagnum* bogs. *Microbial Ecology* 36:259-269.

Cook, ME & Graham, LE. 1998. Structural similarities between surface layers of selected charophycean algae and bryophytes and the cuticles of vascular plants. *International Journal of Plant Sciences* 158:780-787.

Cook, ME & Graham, LE. 1998. Cytokinesis and nodal anatomy in the charophycean green alga *Chara zeylanica*. *Protoplasma* 203:65-74.

Cook, ME, Graham, LE & Lavin, CA. 1997. Comparative ultrastructure of plasmodesmata of *Chara* and selected bryophytes: toward an elucidation of the evolutionary origin of plant plasmodesmata. *American Journal of Botany* 84:1169-1178.

Frost, TM, Graham, LE, Elias, JE, Haase, MJ, Kretchmer, DW & Kranzfelder, JA. 1997. A yellow-green symbiont in the freshwater sponge *Corvomyenia everetti*: Convergent evolution of symbiotic associations. *Freshwater Biology* 38:395-399.

Graham, JM, Arancibia-Avila, P & Graham LE. 1996. Physiological ecology of the filamentous green alga *Mougeotia* (Zygnematales, Charophyceae) under acidic conditions: light and temperature effects on photosynthesis and respiration. *Limnology & Oceanography* 41:253-262.

Graham, JM, Arancibia-Avila, P & Graham, LE. 1996. Effects of pH and selected metals on growth of the filamentous green alga *Mougeotia* (Zygnematales, Charophyceae) under acidic conditions. *Limnology & Oceanography* 41:263-270.

Graham, LE 1996. Green algae to land plants: an evolutionary transition. *Journal of Plant Research* 109:241-251.

Kroken, SB, Graham, LE & Cook, ME. 1996. Occurrence and evolutionary significance of resistant cell walls in charophytes and bryophytes. *American Journal of Botany* 83:1241-1254.

Graham, LE, Graham, JM, Russin, WA & Chesnick, JM. 1994. Occurrence and phylogenetic significance of glucose utilization by charophycean algae: Glucose enhancement of growth in *Coleochaete orbicularis*. *American Journal of Botany* 81:423-432.

Brown, RC, Lemmon, BE & Graham, LE. 1994. Morphogenetic plastid migration and microtubule arrays in mitosis and cytokinesis in the green alga *Coleochaete orbicularis*. *American Journal of Botany* 81:127-133.

Graham, LE, Graham, JM & Wujek, DE. 1993. Ultrastructure of *Chrysodidymus synuroideus* (Synurophyceae). *Journal of Phycology* 29:330-341.

Graham, LE & Kaneko, Y. 1991. Subcellular structures of relevance to the origin of land plants (embryophytes) from green algae. *Critical Reviews in Plant Science* 10:323-342

Delwiche, CF, Graham, LE & Thomson, N. 1989. Lignin-like compounds and sporopollenin in *Coleochaete*, an algal model for land plant ancestry. *Science* 245:399-401.

Graham, LE & Repavich, WM. 1989. Spermatogenesis in *Coleochaete pulvinata* (Charophyceae): Early blepharoplast development. *American Journal of Botany* 76:1266-1278.

Graham, JM & Graham, LE. 1987. Growth and reproduction of *Bangia atropurpurea* (Roth) C. Ag. (Rhodophyta) from the Laurentian Great Lakes. *Aquatic Botany* 28:317-331.

Graham, LE & Taylor, C, III. 1986. Occurrence and phylogenetic significance of "special walls" at meiosporogenesis in *Coleochaete*. *American Journal of Botany* 73:597-601.

Graham, LE & Taylor, C. III. 1986. The ultrastructure of meiospores of *Coleochaete pulvinata* (Charophyceae). *Journal of Phycology* 22:299-307.

Graham, LE, Graham, JM & Kranzfelder, JA. 1986. Irradiance, daylength and temperature effects on zoosporogenesis in *Coleochaete scutata*. *Journal of Phycology* 22:35-39.

Graham, LE. 1985. The origin of the life cycle of land plants. *American Scientist* 73:178-186.

Graham, JM, Graham, LE & Kranzfelder, JA. 1985. Light, temperature and photoperiod as factors controlling reproduction in *Ulothrix zonata* (Ulvophyceae). *Journal of Phycology* 21:235-239.

Graham, LE. 1984. An ultrastructural examination of putative multilayered structures in *Trentepohlia aurea*. *Protoplasma* 123:1-7.

Graham, LE & Wedemayer, GJ. 1984. Spermatogenesis in *Coleochaete pulvinata* (Charophyceae). *Journal of Phycology* 20:302-309.

Hoffman, JP & Graham, LE 1984. Effects of selected physicochemical factors on growth and zoosporogenesis of *Cladophora glomerata* (Chlorophyta). *Journal of Phycology* 20:1-7.

Graham, LE & Wilcox, LW. 1983. The occurrence and phylogenetic significance of putative placental transfer cells in the green alga *Coleochaete*. *American Journal of Botany* 70:113-120.

Wedemayer, GJ, Wilcox, LW & Graham, LE. 1982. *Amphidinium cryophilum sp. nov.* (Dinophyceae), a new freshwater dinoflagellate. I. Species description using light and scanning electron microscopy. *Journal of Phycology* 18:13-16.

Wilcox, LW, Wedemayer, GJ & Graham, LE. 1982. *Amphidinium cryophilum sp. nov.* (Dinophyceae), a new freshwater dinoflagellate. II. Ultrastructure. *Journal of Phycology* 18:18-30.

Graham, LE. 1982. The occurrence, evolution and phylogenetic significance of parenchyma in *Coleochaete* Bréb. *American Journal of Botany* 69:447-454.

Graham, LE. 1982. Cytology, ultrastructure, taxonomy and phylogenetic relationships of Great Lakes filamentous algae. *Journal of Great Lakes Research* 8:3-9.

Graham, LE & Graham, JM. 1980. Endosymbiotic *Chlorella* (Chlorophyta) in a species of *Vorticella* (Ciliophora). *Transactions of the American Microscopical Society* 99:160-166.

Graham, LE & McBride, GE. 1979. The occurrence and phylogenetic significance of a multilayered structure in *Coleochaete* spermatozoids. *American Journal of Botany* 66:887-894.

Graham, LE & Graham, JM. 1978. Ultrastructure of symbiotic *Chlorella* in a *Vorticella*. *Journal of Protozoology* 25:207-210.

Graham, LE & McBride GE. 1976. Mitosis and cytokinesis in the sessile sporangium of *Trentepohlia aurea* (Chlorophyceae). *Journal of Phycology* 14:132-137.

Graham, LE & McBride GE. 1975. The ultrastructure of multilayered structures associated with flagellar bases in motile cells of *Trentepohlia aurea*. *Journal of Phycology* 11:86-96.

Technical reports:

Graham, JM, Graham, LE & Kranzfelder, JA. 1987. Effect of Diquat on non-target phytoplankton species. Commissioned by and reported to the Chevron Chemical Company.

Presentation abstracts (numerous, not listed)

National & International Service (examples):

- Multiple NSF Panels; evaluations of tenure packages
- Outreach educational service, representing Phycological Society of America, AAAS Family Days activity booth event, Boston, MA, 2013.
- Editorial Boards
    - nternational Journal of Plant Sciences, Editorial Board
      Botanical Society of America, past Editorial Board *Am. J. Botany*
      International Phycological Society past Associate Editor *Phycologia*
      Phycological Society of America past Editorial Board member *J. Phycol.*
      International Society for Microbial Ecology past Editorial Board, *Microbial Ecology*

Family:

Married to James M. Graham, Ph.D.
Children: Michael E. Graham (B. S. Biology UW-Madison), bioinformatics specialist Hologic, Inc. Madison, WI
Melissa E. Graham, 4th year student, UW Madison College of Veterinary Medicine, 2014-17 Resident in Anatomical Pathology