

**WAYNE W. CARMICHAEL**  
September 2004

**CURRICULUM VITA**

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Dept. of Biological Science

Wright State University      E-MAIL: "WAYNE.CARMICHAEL@WRIGHT.EDU"  
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Education

A.A.      Portland Community College, Portland, Oregon, 1967  
B.Sc      Oregon State University, Corvallis, Oregon, 1969  
M.Sc      University of Alberta, Edmonton, Alberta, 1972  
Ph.D.      University of Alberta, Edmonton, Alberta, 1974; Supervisor, Dr. Paul R. Gorham.

Appointments/Awards

1970-72      National Research Council Research Assistant Award, University of Alberta.  
1972-74      Graduate Teaching Assistantship Award, University of Alberta.  
1974-76      Post-Doctoral Appointment, Dept. of Botany; Faculty of Pharmacy, University of Alberta,  
Edmonton, Alberta  
Sept. 1976      Assistant Professor of Biology, Department of Biological Sciences, Wright State  
University. Appointment in Aquatic Biology/ Toxicology.  
Sept. 1981      Associate Professor with tenure - Dept. of Biological Sciences, Wright State University.  
1987-88      Outstanding Research Award - College of Science and Mathematics, Wright State  
University.  
Sept. 1988      Full Professor - Dept. of Biological Sciences, Wright State University.  
1989-1990      Outstanding University Research Award -Wright State University.  
1995-1998      Brage Golding Distinguished Professor of Research - Wright State University  
2002-2003      Associate Director, Environmental Sciences PhD Program-Wright State University  
2003-present      Director , Environmental Sciences PhD Program-Wright State University

Professional Leave -Visiting Faculty Appointments

Professional Leave - University of Hawaii - Department of Chemistry-July 1986-July 1987.

Visiting Scientist-

University of Dundee - Dundee, Scotland -Department of Biological Sciences - July 1983 and  
July 1984  
Norwegian Institute of Water Research - Oslo, Norway - July 1983 and August 1984.  
Hydrobiological Institute - Academy of Sciences - Wuhan, Hubei, P.R. China - September -  
October 1986.  
National Institute for Environmental Studies - Japan Environment Agency - Tsukuba, Japan -  
Dec. 5-17, 1988.  
Department of Microbiology - University of Helsinki - Sept. 1989.  
Hydrobiological Institute - Academy of Sciences - Wuhan - P.R. China - August 1990.  
Leningrad Nuclear Physics Institute - Acad. Sci. - USSR Biopolymer Laboratory - May 1990.  
Hydrobiological Institute - Academy of Sciences - Wuhan - P.R. China - August 1991.

Visiting Lecturer/Scientist - Institute of Zoology - University of Porto - Porto, Portugal - May-June  
1992. Supported by the Luso-Americana Foundation.

Visiting Lecturer/Professor - Nucleo De Pesquisas De Produtos Naturais - Universidade Federal  
Do Rio DeJaneiro, Brazil - July 1992. Supported by the Federal University.

Visiting Professor - Shanghai Medical Institute - School of Public Health - Shanghai, P.R. China -  
1992-1995.

Visiting Research Professor - University of Tokyo - Research Center for Advanced Science and  
Technology. Toyo Suisan Endowed Chair in Marine Biotechnology. January - May 1993.

Ukrainian Academy of Sciences-Institute of Hydrobiology, Kiev, Ukraine-Jan 1998

Visiting Professor-CSIRO-Land and Water, Brisbane, Australia, January-June 1998

Ukrainian Academy of Sciences-Institute of Hydrobiology, Kiev, Ukraine-Aug. 1999

#### Scientific Society Affiliations

American Association for the Advancement of Science (AAAS)

International Society of Toxinology (IST)

Societas Internationalis Limnologiae (SIL)

North American Lake Management Society (NALMS)

The Ohio Academy of Sciences (OAS)

Ohio Lake Management Society (OLMS)

#### Commission Membership

International Union of Pure and Applied Chemistry - Food Commission - Working Group on Aquatic Biotoxins

Organizing member of joint cooperative research between the National Institute of Environmental Sciences (NIES) Japan and the U.S. Environmental Protection Agency (USEPA) - Toxic Cyanobacteria

US representative to ISO/TC 147/SC 2/WG 47 setting of protocol for analyses of cyanotoxins

#### Workshops

Workshop on Microbial Contamination in Drinking Water. Airlie House, Virginia, Dec. 1981.

Member of Panel on "Agents of Waterborne Disease." U.S.E.P.A./ASM.

Workshop on Food Contamination - Mycotoxins and Phycotoxins - Cairo, Egypt - National Research Center. November 4-15, 1990. "Freshwater Toxins of Cyanobacteria." USAID, IUPAC, FDA and Egyptian Scientific Research.

Workshop on Phycotoxins - IUPAC Mycotoxin and Phycotoxin, VIII Int. Symposium - Mexico City, Mexico. November 12, 1992. "Toxic Freshwater

Cyanobacteria."

Workshop on Blue-green Algal Toxins - Adelaide, Australia - March 22-26, 1994. Sponsored by the American Water Works Association (AWWA) and the Australian Centre for Water Quality Research. Member of the Organizing Committee and Session Chair.

Workshops-Water quality--AWWARF, Brazil, Morocco, WHO, Portugal, Italy (1999-2000)

#### Journal Referee

Science, Journal of Phycology, Bioscience, Hydrobiologica, South African Journal of Science, Journal of American Veterinary Medicine Association, Toxicon, Chemico-Biological Interactions, Archivs für Hydrobiologie, Applied and Environmental Microbiology, Natural Toxins, Australian J. Marine and Freshwater Res., Ecovision World Monographs

#### Editorial Board Member

Toxicon, Natural Toxins, J. Applied Phycology, J. Toxicology - Toxin Reviews

#### Conference Organization

1980 - International Conference on the Water Environment: Algal Toxins and Health. Sponsored by the U.S.E.P.A., Wright State University, Dayton, OH. (Conference chair)

1989 - Gordon Research Conference on Mycotoxins and Phycotoxins. North Plymouth, NH. (Conference Co-chair)

1991 - Gordon Research Conference on Mycotoxins and Phycotoxins. North Plymouth, NH. (Conference Chair)

1998-International Conference on Toxic Cyanobacteria-Duke Marine Lab, North Carolina (Conference Co-Chair)

#### Grant Reviewer

U.S. Environmental Protection Agency;

Environmental Research Council, Great Britain;

NIH - NIEHS - Toxicology Section

NSF - Regulatory Biology; Community Ecology Program; Biological Oceanography Program

FDA - Office of Orphan Products Development

Ohio Sea Grant

Minnesota Sea Grant

Hawaii Sea Grant

Swiss National Science Foundation - Div. of Biology and Medicine

International Foundation for Science (IFS), Stockholm, Sweden

International Science Foundation-Europe

### Grants/Contracts Received

USEPA; NSF; USARDC; USAMRDC; NIH/NIAID; PHS/NIH; TVA; AWWARF; Salton Sea Authority; State of Florida, Industry

### Current Contracts/Grants

1. USEPA-Development of cyanotoxin standards for Clean Water monitoring
2. PHS-NIH - New Bioactive compounds of cyanobacteria - University of Illinois
3. USEPA-Development of biomarkers for microcystin analyses in human tissues and sera
4. State of Florida-St Johns River Authority

### Research Interests

Current Research Areas: Emphasize the following with regard to blue-green algae (cyanobacteria) toxins (biotoxins and cytotoxins):

1. Collection, isolation and culture of freshwater and marine toxic strains.
2. Large scale culture techniques for toxic strains.
3. Isolation and chemical characterization of pharmacologically active compounds.
4. Toxinology and pharmacology.
5. Induction and regulation of pharmacologically active compounds.

### Publications, book chapters and papers/posters presented

Wayne W. Carmichael  
Professor, Biological Sciences

# in each category

P = scientific paper (oral)	75
PO = poster	77
I/R = invited/reviewed paper	45
Refereed = (does not include papers submitted)	157

### RECENT PUBLICATIONS-1998-2004 - W. CARMICHAEL

Lankoff, A., Carmichael, W.W., Grasman, K.A., and Yuan, M. 2004. The uptake kinetics and immunotoxic effects of microcystin-LR in human and chicken peripheral blood lymphocytes in vitro. *Toxicology*. 204:23-40.

Yuan, M. and Carmichael, W.W. 2004. Detection and Analysis of the Cyanobacterial Peptide Hepatotoxins Microcystin and Nodularin Using SELDI-TOF Mass Spectrometry. *Toxicon*. 44(5): 561-570.

Carmichael, W.W. Algal Poisoning. In Kahn, C.M. Ed. *The Merck Veterinary Manual*. 9<sup>th</sup> Ed. 2003.

Li, R.H., W.W. Carmichael and P. Pereira. 2003. Morphological and 16S rRNA gene evidence for reclassification of the paralytic shellfish toxin producing *Aphanizomenon flos-aquae* LMECYA 31 as *Aphanizomenon issatschenkoi*. *J. of Phycol.* 39: 814-818.

Babcock-Jackson, L., W.W. Carmichael and D.A. Culver. 2002. Dreissenid mussels increase exposure of benthic and pelagic organisms to toxic microcystins. *Verh. Internat. Verein. Limnol.* (Verhandlungen-Congress, Melbourne, Australia-2001) 28: 1082-1085.

Li, R. H., Carmichael, W.W., Brittain, S., Eaglesham, G.K., Shaw, G.R., Liu, Y.D. and Watanabe, M.W. 2001. First report of the cyanotoxins cylindrospermopsin and deoxycylindrospermopsin from *Raphidiopsis curvata* (Cynaobacteria). *J. Phycol.* 37: 1-6.

Kankaanpää, H.T., Sipiä, V.O., Kuparinen, J.S., Ott, J.L., Carmichael, W.W. 2001. Nodularin analyses and toxicity of *Nodularia spumigena* (Nostocales, Cyanobacteria) waterbloom in the western Gulf of Finland, Baltic Sea, in August 1999. *Phycologia*. 40 (3): 268-274.

Carmichael, W.W. 2001. Health Effects of Toxin Producing Cyanobacteria: "The CyanoHABS". Human and Ecological Risk Assessment. *7*(5): 1393-1407.

Li, R.H., Debella, H.J., Carmichael, W.W. 2001 ***Arthrospira maxima*** (Oscillatorales, Cyanobacteria) is identical to *Arthrospira fusiformis* based on morphological characteristics and 16S rRNA gene sequences. *Phycologia*. 40(4): 367-371.

Vanderploeg, H.A., Liebig, J.R., Carmichael, W.W., Agy, M.A., Johengen, T.H., Fahnenstiel, G.L., Nalepa, T.F. 2001. Zebra mussel (*Dreissena polymorpha*) selective filtration promoted toxic *Microcystis* blooms in Saginaw Bay (Lake Huron) and Lake Erie. *Canadian Journal of Fisheries and Aquatic Sciences* 58(6): 1208-1221.

Carmichael, W.W. 2001 A Mini-Review of Cyanotoxins; Toxins of Cyanobacteria (Blue- green algae). In: de Koe, W.J., Samson, R.A., van Egmond, H.P., Gilbert, J. and Sabino, M. (eds.) *Mycotoxins and Phycotoxins in Perspective at the turn of the Century*. Proceedings of the X international IUPAC Symposium, Mycotoxins and Phycotoxins, Guarujá-Sao Paulo, Brazil-May 21-25, 2000. Published by W.J. de Koe, Hazecamp-The Netherlands. pp.495-504.

Carmichael, W.W., Azevedo, M.F.O., An, J.S., Molica, R.J.R., Jochimsen, E.M., Lau, S., Rinehart, K.L., Shaw, G.R., Egelsham, G.K. 2001. Human Fatalities from Cyanobacteria: Chemical and Biological Evidence for Cyanotoxins. *Environmental Health Perspectives*. 109 (7):663-668.

Zimba, P.V., Khoo, L., Gaunt, P., Carmichael, W.W., Brittain, S. 2001. Confirmation of Catfish Mortality from *Microcystis* toxins. *J. of Fish Diseases*. 24:41-47.

Li, R.H, Carmichael, W.W., Brittain, S., Eaglesham, G.K, Shaw, G.R., Noparatnaraporn, A.M.N., Yongmanitchai, W., Kaya, K., Makoto, W. 2001. Detection of Cylindrospermopsin from a strain of *Cylindrospermopsis raciborskii* (Cyanobacteria) isolated from Thailand. *Toxicon* 39:973-980.

Sipiä, V., Kankaanpää, H., Lahti, K., Carmichael, W.W., Meriluoto, J. 2001. Detection of nodularin in flounders and cod from the Baltic Sea. *Environmental Toxicology*. 16(2):121-126.

Park, H., Namikoshi, M., Brittain, S.M., Carmichael, W.W., Murphy, T. 2001. [D-Leu<sup>1</sup>] microcystin-LR, a new microcystin isolated from waterbloom in a Canadian prairie lake. *Toxicon*. 39(6): 855-862.

Li, R., Carmichael, W.W., Liu, Y. and Watanabe, M.M. 2000. Taxonomic re-evaluation of *Aphanizomenon flos-aquae* NH-5 based upon morphology and 16S rRNA gene sequences. *Hydrobiologia*, 438(1): 99-105.

Brittain, S., Wang, J., Babcock-Jackson, L., Carmichael, W.W., Rinehart, K.L. and Culver, D.A. 2000. Isolation and Characterization of microcystins, cyclic heptapeptide toxins from a Lake Erie strain of *Microcystis aeruginosa* *J. Great Lakes Res.* 26(3): 241-249.

Beasley, V.R., R.A. Loveall, K.R. Holmes, H.E. Walcott, D.J. Schaeffer, W.E. Hoffman and W. W.

Carmichael. Microcystin-LR decreases hepatic and renal perfusion, and causes circulatory shock, severe hypoglycemia, and terminal hyperkalemia in intravascularly dosed swine. 2000. J. Toxicology & Envir. Health-Part A. 61(4): 281-303.

Carmichael, W.W., C. Drapeau, D.M. Anderson. 2000. Harvesting and Quality Control of Aphanizomenon flos-aquae from Klamath Lake for Human Dietary Use. J. Applied Phycology. 12: 585-595.

Brittain, S., Mohamed, Z.A, Wang, J., Lehman, V.K.B., Carmichael, W.W., Rinehart, K.L. and El-Sharouny, H.M. 2000. Isolation and Characterization of microcystins from a Nile River strain of *Oscillatoria tenuis* Agardh ex Gomont. Toxicon 38: 1759-1771.

Carmichael, W.W., An J-S. Using an enzyme linked immunosorbant assay (ELISA) and a protein phosphatase inhibition assay (PPIA) for the detection of microcystins and nodularins. 1999. Natural Toxins. 7:377-385.

Shi, L., Carmichael, W.W. and Kennelly, P.J. 1999. Cyanobacterial PPP family protein phosphatases possess multifunctional capabilities and are resistant to microcystin-LR. The J. Biological Chemistry 274(15): 10039-10046.

Bartram, J, Carmichael, W.W., Chorus,I., Jones, G. and Skulberg, O.M. 1999. Chapter one- Introduction. In: Toxic Cyanobacteria in Water: A Guide to their public health consequences, monitoring and management. Published for WHO by E&FN Spon-Rutledge, p.1-14.

Jochimsen, E.M., Carmichael, W.W., An, J.S., Cardo, D.M., Cookson, S.T., Holmes, C.E.M., Antunes, M.b. de C., Filho, D.A. de Melo, Lyra, T.M., Burreto, V.S.T. , Azevedo, S.M.F.O. and Jarvis, W.R. 1998. Liver Failure and death following exposure to microcystins at a hemodialysis center in Brazil. New Eng. J. Medicine. March 26, 1998, 338(13): 873-878.