JEFFREY S. CARMICHAEL
CURRICULUM VITAE

Department of Biology
University of North Dakota
Grand Forks, ND 58202

EDUCATION

Ph.D. in Botany (1995), University of Georgia
Dissertation: Fertilization in *Gnetum gnemon*: its bearing on the evolution of sexual reproduction in seed plants.

B.S. in Biology (1990), Slippery Rock University, PA
Honors project: The ultrastructure of colon cancer in mice
Graduated Magna Cum Laude

PROFESSIONAL EXPERIENCE

- Associate Professor of Biology and Introductory Biology Lecture/Lab Coordinator. University of North Dakota (2001-present).
  Courses taught on a routine basis:
  General Biology I and II
  Plant Form and Function
- Assistant Professor of Biology and Introductory Biology Lecture/Lab Coordinator. University of North Dakota (1995 - 2001).
- Instructor, "Science in the Circle of Life", 2004. A summer science program for prospective American Indian students.
- Co-Instructor, Teaching with Technology Workshop, Summer 2000, University of North Dakota.
- Co-Instructor, Health Careers Opportunity Program, 2000. Sponsored by InMed (Indians into medicine).
- Biology Lab Coordinator (temporary), University of Georgia, 1994.
- Teaching/Laboratory Assistant, University of Georgia, 1990-1995.
  Laboratory courses taught on a routine basis:
  Principles of Biology (non-majors)
  General Biology (majors)
  General Botany - honors class
  Plant Anatomy
  Evolutionary History of Land Plants
- Co-instructor, High School Agriculture Science Teacher Workshop, University of Georgia, 1994.
- Undergraduate Biology and Botany Lab Assistant and Peer Tutor, 1988-1990.
- Oak Ridge Science and Engineering Research Semester Participant, 1989. Sponsored by the U.S. Department of Energy.

RESEARCH EXPERIENCE

Recent research (conducted in collaboration with students at the University of North Dakota):

Semigamy in higher plants.
Effects of Selenium on plant growth and development.
Reproductive cell cycle of higher plants.
Reproductive biology of invasive weeds.

Doctoral research:

Fertilization in *Gnetum*: its bearing on the evolution of sexual reproduction in seed plants.

Undergraduate research:

Enzyme kinetics of native, denatured, and renatured cellulase. Oak Ridge Science and Engineering Research Semester, Oak Ridge National Laboratory, Tennessee.
The development of colon cancer in mice: a TEM study. Slippery Rock University, PA.

RESEARCH PROJECTS SUPERVISED

Graduate student: Jessica Gebur. Reproductive biology of *Rudbeckia hirta*. Current M.S. student.
Undergraduate student: Terrie Mann. Bud conversion in daylilies. Current student.
Graduate student: Ruth Hopkins, M.S. in Biology, University of North Dakota. 2005. Medicinal use of native plant species by the Lakota and Dakota Tribes.
Undergraduate student: Georgeann Collins, Biology Department, University of North Dakota. "Effects of selenium on root, stem, leaf, and seed development in canola". McNair Student.
Undergraduate student: Amanda Olson, Biology Department, University of North Dakota. “Effects of selenium on development and seed yield in sunflowers”.
Undergraduate student: Katy Euliss, Biology Department, University of North Dakota. “Effects of selenium on canola (*Brassica napus*): implications for phytoremediation of selenium-rich soil. Honors Thesis project. Howard Hughes Fellowship.
Graduate student: Courtney Haycraft, M.S. in Biology, University of North Dakota. 1998. “Development of male abortive ovules in *Gnetum gnemon*”.
Undergraduate student: Sarena Selbo, Biology Department, University of North Dakota. “Reproductive biology of leafy spurge”. Honors Thesis project.

GRANTS FOR RESEARCH AND EDUCATION

ND EPSCoR. 2003. Acquisition of a confocal laser scanning microscope for biological research. $90,000 (108,390 total cost).
University of North Dakota (internal funding). 2002. Renovation of the Biology Department Computer Learning Laboratory (equipment valued at $44,800). Co PI.
Bush Foundation. Making Connections: Students, Faculty, Community. 1998. $20,000. One of six committee members who prepared the proposal.

North Dakota EPSCoR. Gametophyte ontogeny in nonflowering seed plants: evidence of heterochrony during the evolution of the seed plant female gametophyte ($40,000: 1996-1998).

GRANTS FOR RESEARCH AND EDUCATION (Continued)

University of North Dakota (internal funding). Development of a Biology Department Computer Learning Laboratory ($34,000; 1996)- currently used in our introductory biology courses.

University of Georgia Small Grants for Graduate Student Research. Fertilization in *Gnetum*: its bearing on the evolution of sexual reproduction within the Gnetales ($750; 1992).

George Smith Summer Research Award. The development of colon cancer in mice: a TEM study ($500; 1989).

STUDENT-REFEREED PUBLICATION

Euliss, K.W. and J.S. Carmichael. 2004. The effects of selenium accumulation in hydroponically grown canola (Brassica napus). Journal of Young Investigators 10(1). This is an on-line journal for undergraduates. The article can be found at the following internet site: http://www.jyi.org/volumes/volume10/issue1/articles/euliss.html

PEER-REVIEWED PUBLICATIONS

Carmichael, J.S. 2003. Plant growth and development: fertilisation. Encyclopedia of Applied Plant Sciences. Academic Press, Ltd.

Carmichael, J.S. 2001. Gnetales. Encyclopedia of Life Sciences. Nature Publishing Group, Macmillan Publishers Ltd.

Haycraft, C.J. and J.S. Carmichael. 2001. Development of sterile ovules on bisexual strobili of *Gnetum gnemon*. American Journal of Botany 88: 1326-1330.

Carmichael, J.S. and S.M. Selbo. 1999. Ovule, embryo sac, embryo, and endosperm development in leafy spurge (*Euphorbia esula* L.). Canadian Journal of Botany 77:599-610.

Selbo, S.M. and J.S. Carmichael. 1999. Reproductive biology of leafy spurge (*Euphorbia esula* L.): breeding system analysis. Canadian Journal of Botany 77: 1-5.

Friedman, W.E. and J.S. Carmichael. 1998. Heterochrony and developmental innovation: evolution of female gametophyte ontogeny in *Gnetum* , a highly apomorphic seed plant. Evolution 52: 1016-1030.

Friedman, W.E. and J.S. Carmichael. 1996. Double fertilization in Gnetales: implications for understanding reproductive diversification among seed plants. International Journal of Plant Sciences 157: S77-S94.

Carmichael, J.S. and W.E. Friedman. 1996. Double fertilization in *Gnetum gnemon* (Gnetaceae): its bearing on the evolution of sexual reproduction within the Gnetales and the Anthophyte clade. American Journal of Botany 83: 767-780.

Carmichael, J.S. and W.E. Friedman. 1995. Fertilization in *Gnetum gnemon*: the relationship between the cell cycle and sexual reproduction. The Plant Cell 7: 1975-1988.

Woodward, J., N.E. Lee, J.S. Carmichael, S.L. McNair and J.M. Wichert. 1990. Comparison of the hydrolytic activity and fluorescence of native, guanidine hydrochloride-treated and

renatured cellobiohydrolase I from *Trichoderma reesei*. Biochimica et Biophysica Acta 1037: 81-85.

PEER-REVIEWED PUBLICATIONS (Continued)

Woodward, J., J.S. Carmichael, K.M. Capps, P.C. Herrmann and N.E. Lee. 1990. The competitive inhibition of *Trichoderma reesei* C30 cellobiohydrolase I by guanidine hydrochloride. Federation of European Biochemical Societies 270: 143-146.

MANUSCRIPT IN PREPARATION

Carmichael, J.S. Gametophyte structure and embryo formation in *Rudbeckia fulgida* (Asteraceae).

TEACHING-RELATED PUBLICATIONS (not peer-reviewed)

Morrison-Shetlar, A. and Carmichael, J. 2000. Biology 151L Laboratory Manual, 2nd edition. EMC Paradigm Press, St. Paul, MN.

Morrison-Shetlar, A. and Carmichael, J. 2000. Biology 150L Laboratory Manual, 2nd edition. EMC Paradigm Press, St. Paul, MN.

PUBLISHED ABSTRACTS

Carmichael, J.S. 2004. Asexual embryogenesis in *Rudbeckia fulgida*. Annual Meeting of the Botanical Society of America.

Euliss, K.W. and J.S. Carmichael. 2001. The effects of selenium accumulation in canola (Brassica napus). Annual Meeting of the Botanical Society of America.

Carmichael, J.S. and W.E. Friedman. 1999. The cell cycle of gametes, heterochrony, and the diversification of fertilization patterns in seed plants. Presented at the XVI International Botanical Congress, St. Louis, MO.

Selbo, S.E. and J.S. Carmichael. 1999. Sexual reproduction in leafy spurge (*Euphorbia esula*). Proceedings of the 91st Annual Meeting, North Dakota Academy of Science.

Carmichael, J.S. and S.E. Selbo. 1998. Ovule, embryo, and endosperm development in leafy spurge (*Euphorbia esula* L.). American Journal of Botany 85 (presented at 1998 annual meeting of AIBS).

Selbo, S.E. and J.S. Carmichael. 1998. Reproductive biology of leafy spurge (*Euphorbia esula* L.): pollen tube pathway and breeding system analysis. American Journal of Botany 85 (presented at 1998 annual meeting of AIBS).

Haycraft, C.J. and J.S. Carmichael. 1998. Developmental analysis of male ovules in *Gnetum.* American Journal of Botany 85 (presented at 1998 annual meeting of AIBS).

Friedman, W.E. and J.S. Carmichael. 1998. Heterochrony and developmental innovation: evolution of female gametophyte ontogeny in seed plants. American Journal of Botany 85 (presented at 1998 annual meeting of AIBS).

Carmichael, J.S. 1996. Female gametophyte ontogeny in *Gnetum gnemon*: further evidence of heterochrony during the evolution of the seed plant female gametophyte. American Journal of Botany 83: 35.

Friedman, W.E. and J.S. Carmichael. 1995. The evolution of fertilization and embryo-nourishing patterns within the Gnetales: implications for understanding reproductive diversification within the anthophyte clade. American Journal of Botany 82: 12.

Carmichael, J. S. and W. E. Friedman. 1994. Fertilization in *Gnetum*: its bearing on the evolution of sexual reproduction within the Gnetales. American Journal of Botany 81: 20.

INVITED PRESENTATIONS

How can we teach science better? Reflecting on teaching conference, UND. 2003
XVI Botanical Congress, St. Louis, Missouri, 1999.
Department of Botany, University of Kansas, 1996.
University of Georgia, Center for Plant Cellular and Molecular Biology, 1994.

PROFESSIONAL SERVICE

Esau Award Committee, 2000-2003
Reviewer for National Science Foundation
Reviewer for the United States Department of Agriculture
Reviewer for International Journal of Plant Sciences
Reviewer for American Journal of Botany
Reviewer for Annals of Botany
Reviewer for Canadian Journal of Botany
Reviewer for Journal of Sexual Plant Reproduction.
Reviewer for Proceedings of the Royal Irish Academy.
Community participant: Grand Forks Public Schools Job Shadowing.

ORGANIZATIONS AND AWARDS

Kenan Fellowship, National Tropical Botanical Gardens, Hawaii. (2001)
UND McDermott Teaching Award, $2,000 (2001)
UND Faculty Instructional Development Professorship, $2,700 (1998)
Excellence in Teaching Award, University of Georgia, $250 (1995)
Outstanding Graduate Teaching Award, University of Georgia (1993)
Graduate Enhancement Award, University of Georgia, $1,000 (1994)
Tri Beta Biology Honorary, Slippery Rock University Chapter, President (1990)
Outstanding Biology Senior, Slippery Rock University (1990)

PROFESSIONAL EDUCATION & CONSULTANT ACTIVITIES

Reviewer- Biology for Majors. Wolfe, Starr, Hertz, McMillan. Brooks/Cole Thompson Learning.
Reviewer- Campbell Presentation Media. Benjamin Cummings.
Reviewer- Biology. Solomon, Berg, Martin.
Reviewer- New biology textbook, untitled. Brooks-Cole/Wadsworth
Author and Consultant, Reindeer Educational Software.
Reviewer for: Vodopich, D.S., and R. Moore. 1996. Biology Laboratory Manual. W.C. Brown Publishers, Dubuque, IA.
Reviewer- “Life”, second edition, by Ricki Lewis.

Reviewer- “Biology Lab Manual”, EMC Paradigm Custom Publishing.
Reviewer- “Biology”, sixth edition, by Raven & Johnson.
Reviewer- “Life”. 4th ed. By Ricki Lewis.
Reviewer for Introductory Biology Laboratory Manuals. EMC Paradigm Custom publishing.