

# Diana E. Northup

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## Highlights

Diana Northup has been studying things that live in caves since 1984. She has a Ph.D. in Biology from the University of New Mexico. She and her colleagues on the SLIME (Subsurface Life In Mineral Environments) Team are investigating how microbes help form the colorful ferromanganese deposits that coat the walls of Lechuguilla and Spider Cave in Carlsbad Caverns National Park (funded by the National Science Foundation Life in Extreme Environments Program); how these deposits compare to surface desert/rock varnish coatings (funded by the NSF Geosciences Directorate); how microbes participate in the precipitation of calcium carbonate formations called pool fingers; and the microbial diversity located in the hydrogen sulfide cave, Cueva de las Sardinias in Tabasco, Mexico. Diana has recently been honored by having her work featured on NOVA and by being asked to serve as a Guest Editor for *Geomicrobiology Journal* for a special issue on Geomicrobiology of Caves. She is also the recipient of a Charles A. and Anne Morrow Lindbergh Foundation grant to study the impact of humans on microbial populations in caves. Currently, Diana blends the best of both worlds by teaching biology students information searching skills as the Biology Librarian in Centennial Library at the University of New Mexico, where she is a full Professor, and by actively researching cave microbial ecology using molecular and microscopy techniques. She is also an Associate Professor of Biology and guest lectures in various Biology courses.

## Education

- 2002 Ph.D., With Distinction, Biology, University of New Mexico
- 1988 Masters of Science, Biology, University of New Mexico
- 1972 Masters of Library Science, Biomedical Librarianship, University of Illinois-UC
- 1969 Bachelor of Arts, Political Science, West Virginia University

## Honors

- Waksman Foundation Microbiology Lecturer, 2002-2004.
- Research featured by CNN, NOVA, local and national newspapers, 1998–
- Best Mentor Award, 1999, ACE-PURSUE Joint Student Conference.

- Barrier Breaker Award for removing one more obstacle from the N.P.S. path, May 11, 1996, El Malpais National Monument.
- Accepted into the Microbial Diversity Course at Woods Hole Marine Biological Laboratory, Summer, 1993, with a \$1000 scholarship
- Designated a Fellow of the National Speleological Society, 1992
- 1990-1992 UNM Regents Lectureship
- 1989 Best Research Paper on a Show Cave presented at the 1989 National Speleological Society Meeting
- 1987 Ralph Stone Research Award from the National Speleological Society
- Graduate Fellowship, 1985-86, Department of Biology, UNM
- Designated a Fellow of the Cave Research Foundation, 1981
- Beta Phi Mu (Library Science Honorary)
- List of Teachers Ranked as Excellent by Their Students, Fall, 1976
- National Library of Medicine Fellowship to attend Biomedical Librarianship Program, Graduate School of Library Science, University of Illinois-UC
- Sophomore Women's Honorary, West Virginia University

## **Research and Professional Experience**

- 11/87 - Biology Reference Librarian; Chemistry and Biology (1988—2002 ) Reference Librarian, Centennial Science and Engineering Library, UNM; Associate Professor, 1993-. Responsibilities include primary responsibility for reference, bibliographic instruction, and collection development for the Department of Biology; and co-responsibility for on-line search services for Centennial Library from 1988-1997. Developed an extensive instruction program in Chemistry and Biology, providing library labs with hands-on experience for several Biology courses.
- 08/03-08/07 PI for the Biogeosciences National Science Foundation Grant to study iron and manganese mineral transformations of cave speleosols and desert/rock varnish.
- 10/98–9/02 Co-PI for the Life in Extreme Environments NSF grant to study geomicrobiological interactions in the deep subsurface of Lechuguilla Cave, Carlsbad Caverns National Park. Administered the grant, mentored and supervised students on the project, and did the molecular, enumeration, and metabolic activity aspects of the project.
- 01/86 - 4/87 Curriculum Coordinator, Primary Care Curriculum (PCC), UNM, School of Medicine (SOM). Responsibilities included supervision of case production and development, creation and maintenance of a computerized case file index, and organization of case materials.

- 01/84 - 12/85 Simulated Patient & Assessment Coordinator, PCC, UNM-SOM. Responsibilities included supervision of the evaluation process of PCC students; and recruitment, training and supervision of simulated patients. Developed a manual and extensive training materials for training simulated patients.
- 01/81 - 12/83 Principal Investigator, Clinical Information Searching, a 3-year research grant funded by the National Library of Medicine. The aims of the project included:
  - Identifying categories of biomedical information problems.
  - Constructing problem-based instructional tools reflecting the categories of information problems identified.
- 07/80 - 12/82 Chief, Education and Instruction Programs, Medical Center Library, UNM. Responsibilities included overall responsibility for formal course development and content of user education programs for clientele of the Library, and participation in the delivery of reference and computer search services. Developed an elective short-course in Self-Education Techniques for medical students.
- 07/77 - 06/80 Senior Reference Librarian, Medical Center Library, UNM. Responsibilities included development of user instruction programs provision of reference assistance, publicizing library resources and services, development of policies and procedures, staff development, and supervision of staff engaged in reference, information, and services.
- 10/74 - 06/77 Branch Librarian, Library of the Health Sciences - UC. Responsibilities included planning and preparation of library orientation materials, administration of the Library (including supervision of staff, responsibility for the overall planning of the operation and services of the library, collection development and preparation of budget requests for staff, acquisitions, and supply needs), and reference duties. Supervised the move into the new building/library and planned and implemented new services in the expanded library.
- 08/73 - 10/74 Biology Assistant Librarian, University of Illinois-UC. Responsibilities included supervisory and administrative duties, and provision of reference services.

## Teaching

- For the Biology Department, taught library labs for Animal Physiology, Ecology, Bosque Biology, Ecosystems, Botany, Plant Physiology, Molecular Diversity and Evolution, Immunology, Microbiology, and Mexican high school students. Taught library lab for Anthropology (genetics oriented).
- For Chemistry, co-taught library labs for 3-12 sections of Chemistry 303 every semester from 1999-. From 1988-, have organized and co-taught 6 sessions of Chemistry 499, to teach the new graduate students in chemistry the skills of chemical information searching.
- Geomicrobiology, Spring 1999. Co-designed this new course with Christy Fellows, a fellow graduate student, and taught 25% of it with Christy Fellows, Laura Crossey, and Cliff Dahm.

- Microbial Ecology, Fall 1999. Taught two weeks while Cliff Dahm was gone, including lectures on the phosphorus cycle, sulfur cycle, molecular evolution, and microbial interactions. Spring 2003, guest lectured.
- Ecosystems, Fall 1999 and 2002. Delivered the Phosphorus lecture for Cliff Dahm during his absence.

## Student Advisement

- Supervised an independent study for Amanda Trent to study the effects of UV radiation on cave bacteria, summer 2003.
- Supervised an independent study for David Estes to study exoenzyme production in cave bacteria and to learn molecular biology techniques.
- Supervised a molecular biology independent study for Marc Toso for two semesters.
- Served on Andrea Jo Hunter's Masters of Water Resources Committee and mentored her in her research in Lechuguilla Cave, which culminated in her Professional Paper, entitled: Environmental disturbances of oligotrophic bacteria and effects on water quality in deep karstic pools.
- Mentored Rachel Schelble from 1999-2002 while she worked on the LExEn grant and did a senior thesis.
- Mentored Kathy Dotson from 1999-2000 while she worked on the LExEn grant.
- Mentored Katharine Dahm for her science fair projects 2001 and 2002. She won several prizes.
- Mentored Erin Crossey, a science fair student, on a microbiology project by assisting with microbiological media, autoclaving, pouring of plates, 1999.
- Mentored Rose Galbraith in her science fair project on the impact of humans on microbial communities in Fort Stanton Cave.
- Supervised a mold project by a Bosque Biology undergraduate student of Cliff Crawford, 1993.

## Publications

### Refereed Journal Articles

- **Northup**, Barns, S.M., Yu, Laura, E., Spilde, M.N., Schelble, R.T., Dano, K.E., Crossey, L.J., Connolly, C.A., Boston, P.J., and Dahm, C.N. 2003. Diverse microbial communities inhabiting ferromanganese deposits in Lechuguilla and Spider Caves. *Environmental Microbiology* 5(11): 1071-1086.
- **Northup**, D.E. and Lavoie, K.H. 2001. Geomicrobiology of caves: A review. *Geomicrobiology Journal*, 18(3):199-222. (Lead article for entire issue on Geomicrobiology of Caves)

- Melim, L.A., Shinglman, K.M., Boston, P.J., **Northup**, D.E., Spilde, M.N., and Queen, J.M. 2001. Evidence for microbial involvement in pool finger precipitation, Hidden Cave, New Mexico. *Geomicrobiology Journal* 18(3):311-329.
- Boston, P.J., Spilde, M.N., **Northup**, D.E., Melim, L.A., Soroka, D.S., Kleina, L.G., Lavoie, K.H., Hose, L.D., Mallory, L.M., Dahm, C.N., Crossey, L.J., and Schelble, R.T. 2001. Cave biosignature suites: Microbes, minerals and Mars. *Astrobiology Journal* 1(1):25-55. (**Invited** Paper)
- **Northup**, D.E., Dahm, C.N., Melim, L.A., Spilde, M.N., Crossey, L.J., Lavoie, K.H., Mallory, L.M., Boston, P.J., Cunningham, K.I., and Barns, S.M. 2000. Evidence for geomicrobiological interactions in Guadalupe caves. *Journal of Cave and Karst Studies* 62(2):80-90. (**Invited** Special Issue Paper)
- Jagnow, D.H., Hill, C.A., Davis, D.G., DuChene, H.R., Cunningham, K.I., **Northup**, D.E., and Queen, J.M. 2000. History of the sulfuric acid theory of speleogenesis in the Guadalupe Mountains, New Mexico. *Journal of Cave and Karst Studies* 62(2):54-59.
- Hose, L.D., Palmer, A.N., Palmer, M.V., **Northup**, D.E., Boston, P.J., and DuChene, H.R. 2000. Microbiology and geochemistry of a hydrogen sulphide-rich karst environment. *Chemical Geology* 69(3-4):399-423.
- Angert, E.R., **Northup**, D.E., Reysenbach, A-L., Peek, A.S., Goebel, B.M., and Pace, N.R. 1998. Molecular phylogenetic analysis of a bacterial community in Sulphur River, Parker Cave, Kentucky. *American Mineralogist* v.83 (11 pt. 2): 1583-1592. (Invited paper as a result of the presentation I gave at the 1997 Geological Society of America meeting.)
- Cunningham, K.I., **Northup**, D.E., Pollastro, R.M., Wright, W.G., and LaRock, E.J. 1995. Bacteria, fungi and biokarst in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. *Environmental Geology* 25:2-8.
- **Northup**, D.E., Carr, D.L., Crocker, M.T., Cunningham, K.I., Hawkins, L.K., Leonard, P., and Welbourn, W.C. 1994. Biological investigations in Lechuguilla Cave. *NSS Bulletin* 56(2): 54-63.
- **Northup**, D.E. and Cromer, D.E. 1993. Thermodynamic properties of substances: A selected, annotated guide to the printed literature. *Science & Technology Libraries* 14:57-95.
- **Northup**, D.E., Lavoie, K.H., and Studier, E.H. 1993. Bioenergetics of *Ceuthophilus* camel crickets from Carlsbad Caverns National Park. *Comparative Biochemistry and Physiology* 106A(3):525-529.
- **Northup**, D.E. and Crawford, C.S. 1992. Patterns of fecundity and age class distribution of rhabdophorid “camel crickets” (*Ceuthophilus longipes* and *C. carlsbadensis*) from Carlsbad Cavern. *American Midland Naturalist* 127:183-189.
- **Northup**, D.E., Moore-West, M., Skipper B., and Teaf, S.R. 1983. Characteristics of clinical information searching: Investigation using critical incident technique. *Journal of Medical Education* 58(11):873-881.
- Davis, E., **Northup**, D.E., Self, P.C., and Williams, M. 1977. A two-phased model for library instruction. *Bulletin of the Medical Library Association* 65(1):40-45.

## Non-Refereed Journal Articles

- **Northup**, D.E., Lavoie, K., and Mallory, L. 1997. Microbes in caves. *NSS News* v.55(4):111.
- **Northup**, D.E. 1982. Let's communicate: Editorial response. *Medical Reference Work Quarterly* 1(2):89-90.

## Books

- **Northup**, D.E., Davis Mobley, E., Ingham, K.L., and Mixon, W.W. 1998. *A Guide to Speleological Literature of the English Language : 1794-1996*. St. Louis: Cave Books. 539pp.

## Book Chapters

- Boston, P.J., **Northup**, D.E., and Lavoie, K.H. 2003. (*In Press*) Preserving the unseen as you clean. pp.XX **In:** *Cave Conservation and Restoration*. Hildreth-Werker, V. and Werker, J. (eds.) Huntsville, AL: National Speleological Society.
- **Northup**, D.E. and Lavoie, K.H. 2004. Microbiology in caves. pp.506-509 **In:** Gunn, John (ed.) *Encyclopedia of Cave and Karst Science*. New York: Fitzroy Dearborn Publishers.
- **Northup**, D.E. and L.M. Mallory. 1998. Life in the dark – An unseen world. pp.40-42 **In:** *Lechuguilla: Jewel of the Underground*. rev. 2nd ed. Basel, Switzerland: Speleo Projects. (**Invited** Chapter)
- **Northup**, D.E., Reysenbach, A-L., and N.R. Pace. 1997. Microorganisms and speleothems. pp.261-266 **In:** *Cave Minerals of the World*, 2nd ed. Hill, C.A. and Forti, P. (eds.) Huntsville, AL: National Speleological Society.
- **Northup**, D.E. and Welbourn, W.C. 1997. Life in the twilight zone – Lava-tube ecology. *New Mexico Bureau of Mines & Mineral Resources Bulletin* 156:69-81. (**Invited** Chapter)
- Saunders, K., **Northup**, D.E., and Mennin, S.P. 1985. The library in a problem-based curriculum. pp.71-88. **In:** *Implementing Problem-Based Medical Education: Lessons from Successful Innovations*. Kaufman, A. (ed.) New York: Springer Publishing Company.

## Proceeding Papers

- **Northup**, D.E. and Welbourn, W.C. 1995. Conservation of invertebrates and microorganisms in the cave environment. pp.292-301. **In:** *Proceedings of the National Cave Management Symposium, held in Carlsbad, New Mexico October 27-30, 1993*.
- **Northup**, D.E. 1984. Humanizing the business of medicine: The use of simulated patients to train medical Students. **In:** *Developments in Business Simulation and Experiential Exercises*, Currie, D.M. and Gentry, J.W. (eds.) *Proceedings of the Eleventh Annual Conference of the Association for Business Simulation and Experiential Learning, January 4-6, 1984, Honolulu, Hawaii*. 11:

- Moore-West, M., **Northup**, D., Skipper, B., and Teaf, S. 1984. Information-seeking behavior among physicians practicing in urban and nonurban areas. *Research in Medical Education Proceedings*, Chicago, IL: Association of American Medical Colleges.
- **Northup**, D.E. 1979. Education for health sciences librarianship: The master's curriculum component. pp.73-82. **In:** *Proceedings of the Allerton Invitational Conference on Education for Health Sciences Librarianship, April 2-4, 1979*. Chicago: Medical Library Association.

## Thesis and Dissertation

- **Northup**, D.E. 2002. *Geomicrobiology of Caves*. Ph.D. Dissertation. University of New Mexico, Department of Biology.
- **Northup**, D.E. 1998. *Community Structure of the Arthropods of Carlsbad Cavern emphasizing Rhabdiphoridae of the Genus Ceuthophilus*. Masters Thesis. University of New Mexico, Department of Biology.

## Extended Abstracts

- **Northup**, D., Angert, E., Reysenbach, A-L., Peek, A., and Pace, N. 1997. Microbial communities in Sulphur River, Parker Cave: A molecular phylogenetic study. pp.55-56. **In:** *Conservation and Protection of the Biota of Karst: Extended Abstracts and Field-Trip Guide for the Symposium Held February 13 through 16, 1997, Nashville, Tennessee*. Sasowsky, I.D., Fong, D.W., and White, E.L. (eds). Charles Town, WV: Karst Waters Institute.
- Lavoie, K.H. and **Northup**, D.E. 1994. Distributional survey of actinomycetes in a limestone cave and a lava tube cave. pp.44-45. **In:** *Breakthroughs in karst geomicrobiology and redox geochemistry: abstracts and field-trip guide for the symposium held February 16 through 19, 1994 Colorado Springs, Colorado*. Sasowsky I.D., Palmer M.V. (eds.) Spec Pub 1. Charles Town, WV: Karst Waters Institute, Inc.

## Abstracts

- **Northup**, D.E., Yeager, C.M., Grow, C., Barns, S.M., and Kuske, C.R. 2003. Recovery of the nitrogen cycling bacterial community in soils following the Cerro Grande fire in New Mexico. *Abstracts. American Society for Microbiology, 103rd General Meeting, Washington, D.C., May 19-23, 2003*. 103:N-011.
- **Northup**, D.E., Boston, P.J., Spilde, M.N., Lavoie, K.H., and Hose, L.D. 2002. Microbial sulfur transformations in a sulfide-rich cave in Tabasco, Mexico. *Abstracts with Programs - Geological Society of America* 34(6): p.20.
- Spilde, M.N., Boston, P.J., and **Northup**, D.E. 2002. Subterranean manganese deposits in caves: Analogies to rock varnish? *Abstracts with Programs - Geological Society of America* 34(6): p.493.
- **Northup**, D.E., Barns, S.M., and Bean, L.E. 2002. Evidence for geomicrobiological interactions in Lechuguilla and Spider Cave. *Abstracts. American Society for Microbiology, 102nd General Meeting, Salt Lake City, Utah, May 19-23, 2002*. p. 344.

- Boston, P.J., Spilde, M.N., **Northup**, D.E., and Melim, L.A. 2001. Cave microbe-mineral suites; best model for extraterrestrial biosignatures! *Thirty-second lunar and planetary science conference, Houston, TX, March 12-16, 2001*. Houston, TX: Lunar and Planetary Science Conference. 32.
- Boston, P.J., Spilde, M.N., **Northup**, D.E., and Melim, L.A. 2001. Unique evaporites in caves; comparison to surface-derived deposits. *Abstracts with Programs - Geological Society of America* 33(6):451.
- Melim, L.A., Spilde, M.N., Boston, P.J. ; **Northup**, D.E., and Queen, J.M. 2001. Origin of porous layers in pool fingers, Hidden Cave, New Mexico; recrystallized moonmilk? *Abstracts with Programs - Geological Society of America* 33(6):254-255.
- Spilde, M.N., Boston, P.J., **Northup**, D.E., Dahm, C.N., Crossey, L.J., Mallory, L.M., Schelble, R.T., and Papike, J.J. 2001. Manganese fibers, todorokite, and the mn-oxidizer connection. *Earth system processes, Edinburgh, Scotland, United Kingdom, June 24-28, 2001*. p.123.
- Boston, P.J., Spilde, M.N., **Northup**, D.E., Soroka, D.S., Kleina, L.G., Lavoie, L.H., Melim, L.A., and Hose, L.D. 2001. Pendulous microbial/mineral formations in an active sulfide-dominated cave and possible lithified speleothem analogs in an ancient, inactive cave. *Earth system processes, Edinburgh, Scotland, United Kingdom, June 24-28, 2001*, p.123.
- **Northup**, D.E., Boston, P.J., Barns, S.M., Bean, L.E., Dahm, C.N., Spilde, M.N., Crossey, L.J., Schelble, R.T., and Mallory, L.M. 2001. Geomicrobiological interactions in the subsurface environment of Lechuguilla Cave, New Mexico. *Earth system processes, Edinburgh, Scotland, United Kingdom, June 24-28, 2001*, p.122.
- Boston, P.J., Soroka, D.S., Kleina, L.G., Lavoie, K.H., Spilde, M.N., **Northup**, D.E., and Hose, L.D. 2000. A garden inside out; microbial mats in springs, wall muds, and ceiling formations of a sulfur-dominated cave, Cueva de Villa Luz, Tabasco, Mexico. *Journal of Cave and Karst Studies* 62(3):198.
- **Northup**, D.E., Schelble, R.T., and Mallory, L.M. 2000. Microbial metabolic activity studies in punk rock and corrosion residues in Lechuguilla and Spider Caves, Carlsbad Caverns National Park, New Mexico. *Journal of Cave and Karst Studies* 62(3):187-188.
- **Northup**, D.E., Spilde, M.N., Schelble, R.T., Bean, L.E., Barns, S.M., Mallory, L.M., Boston, P.J., Crossey, L.J., Dotson, K.E., and Dahm, C.N. 2000. Microbial interactions in punk rock and corrosion residues in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. *Journal of Cave and Karst Studies* 62(3):199.
- Spilde, M.N., Crossey, L.J., Dotson, K.E., Schelble, R.T., **Northup**, D.E., Barns, S.M., and Dahm, C.N. 2000. Biogenic influence on mineral corrosion and deposition at Lechuguilla and Spider Caves, New Mexico. *Geological Society of America Abstracts with Programs* 32:A-256.
- Shinglman, K.M., Melim, L.A., Boston, P.J., **Northup**, D.E., Spilde, M.N., and Queen, J.M. 2000. Evidence for microbial involvement in pool finger precipitation, Hidden Cave, New Mexico. *Geological Society of America Abstracts with Programs* 32:A-279.



- Boston, P.J., Spilde, M.N., and **Northup**, D.E. 1999. It's alive! Models of Martian biomarkers derived from terrestrial cave microbiota. *Geological Society of America Abstracts with Programs* 31:A303.
- Spilde, M.N., Boston, P.J., Brearley, A.J., **Northup**, D.E., and Papike, J.J. 2000. Potential biosignatures in caves: Mn-minerals in Lechuguilla Cave, New Mexico. *Journal of Cave and Karst Studies* 62(3):199.
- Spilde, M.N., Crossey, L.J., Dotson, K.E., Schelble, R.T., **Northup**, D.E., Barns, S.M., and Dahm, C.N. 2000. Biogenic influence on mineral corrosion and deposition at Lechuguilla and Spider Caves, New Mexico. *Geological Society of America Abstracts with Programs* 32:A256.
- Dotson, K.E., Schelble, R.T., Spilde, M.N., Crossey, L.J., and **Northup**, D.E. 1999. Geochemistry and mineralogy of secondary mineral deposits, Lechuguilla and Spider Caves, Carlsbad Caverns National Park, NM: Biogeochemical processes in an extreme environment. *Geological Society of America Abstracts with Programs* 31:A154.
- Dotson, K.E., Schelble, R.T., Spilde, M.N., Crossey, L.J., and **Northup**, D.E. 1999. Geochemistry and mineralogy of corrosion residue, Lechuguilla and Spider Caves, Carlsbad Caverns National Park, NM: Biogeochemical processes in an extreme environment. Society for the Advancement of Chicanos and Native Americans in Science Annual Meeting, 7-10 October, 1999, Portland, Oregon.
- Melim, L.A., **Northup**, D.E., Boston, P.J., Queen, J.M., and Allen, C.C. 1999. Evidence for bacterially-mediated precipitation of pool fingers, Hidden Cave, Guadalupe Mountains, NM. *Annual Meeting Expanded Abstracts - American Association of Petroleum Geologists* (1999):A92.
- **Northup**, D.E., Bean, L.E., Spilde, M.N., Boston, P.J., Barns, S.M., Connolly, C.A., Skupski, M.P., Natvig, D.O., and Dahm, C.D. 1999. Geomicrobiological investigations of secondary mineral deposits in the subsurface environment of Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. *4th International Symposium on Subsurface Microbiology, August 22-27, 1999, Marriott's Mountain Resort, Vail, Colorado* p.20-21.
- Boston, P.J., Kleina, L., Soroka, D., Lavoie, K., **Northup**, D., and Spilde, M. 1999. Cave microbes: Microbial mats lining hydrogen sulfide springs. *Abstracts and Programs from the 4th International Symposium on Subsurface Microbiology* p.36.
- **Northup**, D.E., Spilde, M.N. and Boston, P.J. 1999. Microbial interactions with the limestone walls of Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico, USA. *Journal of Conference Abstracts, 11th Bathurst Meeting July 13th-15th, 1999 Cambridge, UK* 4(2):951.
- Spilde, M.N., **Northup**, D.E., and Boston, P.J. 1999. The hunt for red corrosion: A study of microbial rock corrosion in caves. *Microscopy and Microanalysis* 1999:536-537.
- Lavoie, K., **Northup**, D., Boston, P., and Blanco-Montero, C. 1998. Preliminary report on the biology of Cueva de Villa Luz, Tabasco, Mexico. *Journal of Cave and Karst Studies* 60(3):180.

- Spilde, M.N., **Northup**, D.E., Boston, P.J., and Dahm, C.N. 1998. Corrosion residues from Lechuguilla Cave: cozy home or living hell for microbes? *Journal of Cave and Karst Studies* 60(3):180.
- Connolly, C.A., **Northup**, D.E., Barns, S.M., Boston, P.J., and Natvig, D.O. 1998. Phylogenetic analysis of bacterial communities isolated from Four Windows Cave: are they actinomycetes? *Journal of Cave and Karst Studies* 60(3):180.
- **Northup**, D.E., Barns, S.M., Connolly, C.A., Skupski, M.P., Boston, P.J., and Natvig, D.O. 1998. Molecular phylogenetic characterization of unusual microbial communities associated with corrosion residues from Lechuguilla Cave. *Journal of Cave and Karst Studies* 60(3):180.
- **Northup**, D.E. 1998. Eeek!! I killed a microbe: confessions of a cave explorer. *Journal of Cave and Karst Studies* 60(3):183.
- **Northup**, D.E., Angert, E.R., Reysenbach, A-L., Peek, A., and Pace, N.R. 1997. Hydrogen sulfide-based microbial communities in Sulphur River, Parker Cave, Kentucky. *Programs with Abstracts Geological Society of America*. 29(6):A363.
- **Northup**, D.E., Beck, K.M., and Mallory, L.M. 1997. Impact on the microbial communities of Lechuguilla Cave: Is protection possible during active exploration? *Journal of Cave and Karst Studies* 59(3):166.
- Mallory, L., Spokas, L., and **Northup**, D. 1995. Numerical taxonomic comparison of two freshwater microbial communities in Lechuguilla Cave, Carlsbad Caverns National Park. *Abstracts of the General Meeting of the American Society for Microbiology* 95(0):442.

## Book Reviews

- **Northup**, D.E. 1993. Book Review: *Caves and Cave Life*. Chapman, P. *NSS News* 51(11): 305.
- **Northup**, D.E. 1991. Books Reviews (4) **In:** Malinowsky, H.R. (ed.) *Science and Technology Annual Reference Review 1991*. Phoenix, AZ: Oryx Press. 1991. pp.182, 201, 38-39, 65.
- **Northup**, D.E. 1990. Books Reviews (9) **In:** Malinowsky, H.R. (ed.) *Science and Technology Annual Reference Review 1990*. Phoenix, AZ: Oryx Press. pp.29-30, 33, 34-35, 41-42, 63-64, 154, 162, 240.
- **Northup**, D.E. 1982. Book Review: *The Effective Reference Librarian*. *Bulletin of the Medical Library Association* 70(3): 338.

## Self-Published Instructional Materials

- **Northup**, D.E. 1986. *Simulated Patient Handbook*. Albuquerque, NM: University of New Mexico, Primary Care Curriculum.
- **Northup**, D.E. and Umland, B.E. 1983-1984. *Searching for Information: A Self-Directed Learning Guide*. Albuquerque, NM: Medical Center Library. In three volumes:

- *Problem 1: Diagnosis and Treatment: Hirsutism*, 1983
- *Problem 2: Subacute Bacterial Endocarditis*, 1983
- *Problem 4: Drug Side Effects*, 1984
- **Northup**, D.E. and Bowermaster, J.P. 1984. *Searching for Information: A Self-directed Learning Guide*. Albuquerque, NM: Medical Center Library. In two volumes:
  - *Problem 7: An Irresistible Urge to Steal*, 1984
  - *Problem 9: Patient Education: Multiple Sclerosis*, 1984
- **Northup**, Diana E. 1982. *The Organization of Personal Information Files in Medicine*. Albuquerque, NM: University of New Mexico. Medical Center Library.

## Technical Reports

- Northup, D.E. and Spilde, M.N. 2002. *Jewel Cave Corrosion Residue Pilot Study Report*. Unpublished technical report to Jewel Cave National Monument. 13pp.
- Northup, D.E. 1997. *Balancing Conservation of Unusual Cave Microbial Communities With Exploration and Research in Lechuguilla Cave, Carlsbad Caverns*. Unpublished technical report to the Anne D. Morrow and Charles A. Lindbergh Foundation. 10pp.
- Northup, D.E., Carr, D.L., Crocker, M.T., Cunningham, K.I., Hawkins, L.K., Leonard, P., and Welbourn, W.C. 1992. *Lechuguilla Cave Biological Inventory*. Unpublished technical report to the National Park Service. 195pp.
- Northup, D.E., Hardy, J.M., and Ingham, K.L. 1988. *Report to the CCNP on Arthropod Species Diversity in the Big Room and the Environs*. 38pp.
- Northup, D.E., Hardy, J.M., and Ingham, K.L. 1989. *Arthropod species diversity in the Big Room and the environs. 1988 Cave Research Foundation Annual Report*. pp. 39-40.
- Northup, D.E., Ziegler, W.S., and Ingham, K.L. 1988. Community structure of the arthropods of Carlsbad Cavern. *1987 Cave Research Foundation Annual Report*. pp. 30-32.
- Northup, D.E. and Kuper, R. 1987. Natural history of arthropods of Carlsbad Caverns emphasizing Rhabdiphoridae of the genus *Ceuthophilus*. *Cave Research Foundation 1986 Annual Report*, pp. 29-30.
- Ingham, K.L., **Northup**, D.E., and Welbourn, W.C. May 1996. Lava Tube Fire Impact Study: El Malpais National Monument, New Mexico: Final report.

## Grants Received

- Geosciences Directorate, Biogeosciences Competition, National Science Foundation, 4-year grant for \$470,000.00, beginng. Title: Collaborative Research: Identification of Microbial Signatures in Biogenic Cave Ferromanganese Deposits, linked proposal with New Mexico Tech. PIs: Northup, D.E., Spilde, M.N., Crossey, L.J., Dahm, C.N., Boston, P.J. Duration: 08/15/03–08/14/07.

- Life in Extreme Environments Program, National Science Foundation, 3-year grant for \$292,134. NSF DEB 9809096. Title: LEXEN: Geomicrobiological Interactions of Microbial Communities in Cave Deep Subsurface Environments: A Novel Extreme Environment. PIs: Dahm, Clifford N., Crossey, Laura J., and Northup, Diana E. Duration: 10/01/98–09/30/02. I administered this grant, performed or supervised the molecular analyses, and participated in the microscopy studies.
- Research Experiences for Undergraduate Students in Carlsbad Caverns National Park and the Bosque Evapotranspiration Projects. Funds Received: \$18,000. Submitted to NASA PURSUE Program, UNM. PIs: Dahm, Clifford N., Northup, Diana E., and Cleverly, James. Project Duration: 1998-1999. I co-supervised three students under this grant.
- Proposal to Analyze the Microbial Community of Sulphur River, Parker Cave, Kentucky, Using Molecular Phylogenetic Techniques. Submitted to UNM RAC. Funds Received: \$3,000.00 Project Duration: January 1997—September 1997.
- Balancing Conservation of Unusual Cave Microbial Communities with Exploration and Research in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. Submitted to the Anne D. Morrow and Charles A. Lindbergh Foundation. Funds Received: \$10,580. Project Duration: June 1995—December 1996.
- Guide to Speleological Literature. Submitted to the American Library Association Whitney-Carnegie Award. Funds Received: \$5000. Project Duration: January 1995—December 1995.
- El Malpais National Monument Lava Tube Climate Monitoring. Submitted to the National Park Service Funds Received: \$1175. Project Duration: September 1994—December 1995.
- Biological Inventory of Lava Tubes at El Malpais National Monument. Submitted to the National Park Service, June 1993. Funds Requested: \$5000. Funds Received: \$7000. Project Duration: July 1993—December 1995.
- Further Microbial Investigations of Lechuguilla Cave. Submitted to the National Park Service, May 1991. Funds Received: \$3500. This proposal was solicited by the Carlsbad Caverns National Park Cave Resources Office. Project duration: July 1991—October 1992.
- Proposal for a Study of the Distribution and Role of Microorganisms in Lechuguilla Cave, Carlsbad Caverns National Park (CCNP), New Mexico. Submitted to UNM Research Allocations Committee, April 1991. Funds Requested: \$7500. Funds Received: \$3320.
- A Study of Invertebrate Fauna of Mexican Freetail Bat (*Tadarida brasiliensis mexicana*) Guano in Carlsbad Cavern, New Mexico. Submitted to UNM Research Allocations Committee, November 1989. Funds Received: \$2500.
- A Study of Invertebrate Fauna of Mexican Freetail Bat (*Tadarida brasiliensis mexicana*) Guano in Carlsbad Cavern, New Mexico. Submitted to National Speleological Society, October 1989. Funds Requested: \$500. Funds Received: \$250.
- A Biological Inventory of Lechuguilla Cave. Submitted to the National Park Service, August 1989. Funds Requested: \$7000. Funds Received: \$4600.

- A Biological Inventory of Lechuguilla Cave. Submitted to the The National Speleological Society, April 1989. Funds Requested: \$500. Funds Received: \$200.
- Clinical Information Searching. Submitted to National Library of Medicine. Funds Received: \$98,932. Project Duration: 1981-1983.

## **Grants Reviewed**

Reviewed grants for the Charles A. and Anne Morrow Lindbergh Foundation (1998, 1999, 2002) and for the National Science Foundation (2002); National Geographic Society (2003).

## **Delivered Papers at Professional Meetings/Seminars Given**

- Snottites, Phlegm Balls, and Deadly Gases, Oh My! The Microbial Ecology of Sulfur Caves. Michigan Branch of the American Society for Microbiology, October 4th, 2003, Kalamazoo, Michigan.
- Cave Decorating Made Easy: Just Add Microbes. The Geomicrobiology of Caves. Northern California Branch of the American Society for Microbiology, October 11th, 2003, Concord, CA.
- Shedding New Light on a Dark Topic: The Microbial Wonderland of Caves. North Central Branch of the American Society for Microbiology, October 18th, 2003, Oshkosh, WI.
- Recovery of the nitrogen cycling bacterial community in soils following the Cerro Grande fire in New Mexico. American Society for Microbiology, 103rd General Meeting, Washington, D.C., May 19-23, 2003. Co-authors: Yeager, C.M., Grow, C., Barns, S.M., and Kuske, C.R.
- Microbial sulfur transformations in a sulfide-rich cave in Tabasco, Mexico. Oral Presentation at the Geological Society of America Annual Meeting, 27-30 October, 2002, Denver, CO. Co-authors: Boston, P.J., Spilde, M.N., Lavoie, K.H., Schelble, R.T. and Alvarado-Zink, A.
- Geomicrobiological investigations of microbial communities in ferromanganese deposits in Lechuguilla Cave, New Mexico, U.S.A. Oral Presentation at the International Subsurface Microbiology, 7-13 September, 2002, Copenhagen, Denmark. Co-authors: Boston, P.J., and Spilde, M.N.
- Microbial diversity and microbe-mineral interactions in caves. Seminar for the Biosciences Division, Los Alamos National Laboratory, June 18th, 2002.
- Evidence for geomicrobiological interactions in Lechuguilla and Spider Cave. Poster Presentation at the American Society for Microbiology, 102nd General Meeting, Salt Lake City, Utah, May 19-23, 2002. Co-authors: Barns, S.M., and Bean, L.E.
- Geomicrobiology of caves. Dissertation Defense and Department Seminar, Department of Biology, University of New Mexico, November 2001.
- Microbes and Speleothems. Oral Presentation at the Winter Technical Regional, Southwestern Region, National Speleological Society, 8 December 2001, Albuquerque, NM.

- December 2001. Geomicrobiology of Caves, a presentation to scientists at Universum at UNAM, Mexico City, Co-Presenters: Boston, P.J., Spilde, M.N.
- Geomicrobiological interactions in the subsurface environment of Lechuguilla Cave, New Mexico. Oral Presentation at the Earth System Processes - Global Meeting, June 24-28, 2001, Edinburgh, Scotland. Co-authors: Boston, P.J., Barns, S.M., Bean, L.E., Dahm, C.N., Spilde, M.N., Crossey, L.J., Schelble, R.T., and Mallory, L.M.
- Geomicrobiological Investigations in Lechuguilla and Spider Caves. Oral Presentation, Ecology Brown Bag Seminar, Department of Biology, University of New Mexico, November 2000. Co-Presenter: Spilde, M.N.
- Microbial metabolic activity studies in punk rock and corrosion residues in Lechuguilla and Spider Caves, Carlsbad Caverns National Park, New Mexico. Oral Presentation at the Annual Meeting of the National Speleological Society, Elkins, WV, June 26-30, 2000. Co-authors: Schelble, R.T., and Mallory, L.M.
- Microbial interactions in punk rock and corrosion residues in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. Oral Presentation at the Annual Meeting of the National Speleological Society, Elkins, WV, June 26-30, 2000. Co-authors: Spilde, M.N., Schelble, R.T., Bean, L.E., Barns, S.M., Mallory, L.M., Boston, P.J., Crossey, L.J., Dotson, K.E., and Dahm, C.N.
- Green Chile Seminar: Department of Earth and Planetary Sciences, 21 April 2000. Co-Presenter: Spilde, M.N.
- Ecology Brown Bag: Microbial Interactions in Punk Rock and Corrosion Residues in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. 22 March 2000. Co-Presenter: Spilde, M.N.
- Northup, D.E., Bean, L.E., Spilde, M.N., Boston, P.J., Barns, S.M., Connolly, C.A., Skupski, M.P., Natvig, D.O. and C.D. Dahm. Geomicrobiological investigations of secondary mineral deposits in the subsurface environment of Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. Oral Presentation at the 4th International Symposium on Subsurface Microbiology, August 22-27, 1999, Marriott's Mountain Resort, Vail, Colorado, p. 20-21.
- Moderator for session at the 4th International Symposium on Subsurface Microbiology, August 22-27, 1999, Marriott's Mountain Resort, Vail, Colorado.
- Microbial interactions with the limestone walls of Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico, USA. Oral Poster Presentation at 11th Bathurst Meeting July 13th-15th, 1999 Cambridge, UK. Co-authors: Spilde, M.N. and Boston, P.J.
- Molecular phylogenetic characterization of unusual microbial communities associated with corrosion residues from Lechuguilla Cave. Oral Presentation at the Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998. Co-authors: Barns, S.M., Connolly, C.A., Skupski, M.P., Boston, P.J., and D.O. Natvig
- Eeek!! I killed a microbe: confessions of a cave explorer. Oral Presentation at the Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998.

- Corrosion residues from Lechuguilla Cave; cozy home or living hell for microbes? Oral Presentation at the Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998. Co-authors: Spilde, M.N., Boston, P.J., and C.N. Dahm.
- Preliminary report on the biology of Cueva de Villa Luz, Tabasco, Mexico. Oral Presentation at the Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998. Co-presenter: K. Lavoie. Co-authors: Lavoie, K., Boston, P., and C. Blanco-Montero.
- Conservation of microbes in caves. Oral Presentation at the Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998. Co-presenter: P.J. Boston.
- “Acid House”: The microbial community of Cueva de Villa Luz, Tabasco, Mexico. Oral Presentation at the Winter Technical Regional of the Southwest Region of the National Speleological Society, Albuquerque, NM, December, 1998.
- Hydrogen Sulfide-Based Microbial Communities in Sulphur River, Parker Cave, Kentucky. Oral Presentation at the Geological Society of America, Salt Lake City, Utah, October, 1997. Co-authors: Angert, E.R., Reysenbach, A-L., Peek, A. and N.R. Pace. Angert, E.R., Reysenbach, A-L., Peek, A. and N.R. Pace.
- Impact on the microbial communities of Lechuguilla Cave: Is protection possible during active exploration? Oral Presentation at the Biology Section of the National Speleological Society, Annual Meeting held June 23-27, 1997, Sullivan, MO.
- Molecular phylogenetic study of the microbial community in Sulphur River, Parker Cave, Kentucky. Oral Presentation at the National Speleological Society Annual Meeting, August, 1996, Salida, CO. Co-authors: Esther Angert, Anna-Louis Reysenbach, Norman R. Pace.
- Molecular phylogenetic study of Parker Cave. Oral Presentation, Ecology Brown Bag Seminar, Department of Biology, University of New Mexico, November 1995.
- Molecular phylogenetic study of Parker Cave. Oral Presentation, Winter Technical Regional of the National Speleological Society, Albuquerque, NM, December 1995.
- Distribution of actinomycetes in a limestone cave and lava tube. Poster presentation. Breakthroughs in Karst Geomicrobiology, 16-19 February, 1994, Colorado Springs, Colorado. Co-Presenter: Lavoie, K.H.
- Workshop on Identifying Microorganisms. Oral Presentation at the Breakthroughs in Karst Geomicrobiology, 16-19 February, 1994, Colorado Springs, Colorado. Co-Presenter: Lavoie, K.H., Boston, P.J., and Mallory, L.M.
- Conservation of invertebrates and microorganisms in the cave environment. Oral Presentation at the National Cave Management Symposium, October 27-30, 1993, Carlsbad, New Mexico. Co-presenter: Welbourn, W.C.
- Biological resources of Lechuguilla Cave: Is protection possible during active exploration. Oral Presentation at the Cave Biology and Conservation Symposium at the National Natural Areas Conference in Bloomington, Indiana, 27-30 October 1992.

- Overview of biological research in caves and roles for a Cave Research Institute. **Invited** paper at the Cave Research Institute Study Workshop, 19 August, 1992, Albuquerque, New Mexico.
- Invertebrates and Microorganisms of Lechuguilla Cave. Northup, D.E., . Oral Presentation at the National Speleological Society Annual Meeting, Salem, Indiana, 3-7 August 1992. Co-authors: Carr, D.L., Crocker, M.T., Cunningham, K.I., Hawkins, L.K., Leonard, P. and W.C. Welbourn.
- Invertebrates and microorganisms of Lechuguilla Cave. Oral Presentation at the Winter Technical Regional of the Southwest Region of the National Speleological Society, Albuquerque, NM, December, 1991.
- Bioenergetics of camel crickets from Carlsbad Caverns National Park. Oral Presentation at the National Speleological Society Annual Meeting, Cobleskill, New York, July, 1991. Co-authors: Lavoie, K.H. and Studier, E.H.
- Seasonal patterns of species diversity and numbers of mites inhabiting bat guano in Carlsbad Cavern. Oral Presentation at the National Speleological Society Annual Meeting, Cobleskill, New York, July, 1991. Co-Author: Welbourn, W.C.
- Invertebrate species diversity in Carlsbad Cavern. Oral Presentation at the National Speleological Society Annual Meeting, Yreka, California, July, 1990.
- Patterns of reproduction and development of Raphidophorid “camel crickets” (*Ceuthophilus longipes* and *C. carlsbadensis*) from Carlsbad Cavern. Oral Presentation at the National Speleological Society Annual Meeting, Sewanee, Tennessee, August, 1989.
- The Primary Care Curriculum, an innovative experiment in medical education. Oral Presentation at the Mid-Atlantic Chapter of the Medical Library Association, Charleston, WV, November, 1988.
- Preparing self-directed learners: The role of information management education in medical schools. Moderator of this GME Small Group Discussion, November 1, 1984, Association of American Medical Colleges, 95th Annual Meeting.
- Teaching medical information searching in a problem-based format. A workshop conducted at the Western Group on Medical Education Meeting, 29 April-2 May, 1984, Asilomar, California.
- Humanizing the business of medicine: The use of simulated patients to train medical students. Oral Presentation at the Eleventh Annual Conference of the Association for Business Simulation and Experiential Learning, January 4-6, 1984, Honolulu, Hawaii.
- An investigation of clinical information searching. Oral Presentation at the Ninety-Second Annual Meeting of the Association of American Medical Colleges, October 31-November 5, 1981, Washington, D.C.
- Moderator for Contributed Papers Concurrent Session at the 1980 Annual Meeting of the Medical Library Association, 14-19 June, 1980, Washington, D.C..



- Bio-Medical Librarianship Program at the Graduate School of Library Science at the University of Illinois. Oral Presentation at the Midwest Regional Group Meeting of the Medical Library Association, Purdue University, Lafayette, Indiana, October, 1972. Co-Presenter: Lancaster, F.W.

## Public Talks

- Snottites, Phelgmballs, and Deadly Gases, Oh My! The Microbial Ecology of Sulfur Caves. New Mexicans for Scientific Reason, July 9th, 2003.
- Geomicrobiology of Caves. New Mexico State University Geology Departmental Seminar, 9 April 2003.
- Geomicrobiology of Caves. Earlham College Colloquium, Richmond, Indiana. 24 March 2003.
- Amazing New Discoveries. Lyceum Distinguished Speaker Series, Cuyahoga Valley National Park, Brecksville, OH, 28 February 2003. Co-presenter: Penelope Boston.
- Shedding New Light on a Dark Topic: The Microbial Wonderland of Caves. Rio Grande Branch of ASM, 7 February 2003.
- Shedding New Light on a Dark Topic: Biodiversity and Geomicrobiology of Caves. November 1, 2002. Department of Biological Sciences. University of North Texas.
- Sight unseen: Mysterious life caves. 21 August 2002. New Mexico Museum of Natural History and Science. Public lecture to introduce the Amazing Caves movie.
- Sight unseen: Cave life. April 16, 2002. National Parks Week, Carlsbad Cavern National Park.
- Nanobacteria & microbes. July 28, 1999. Presentation to the Chief Interpreters of the National Park Service, Albuquerque, NM. Co-Presenter: Penelope J. Boston.
- Cave Life. A talk to 5th graders at Our Lady of Annunciation School, 15 April, 1999.
- Conservation of microbes in caves. Presented at Carlsbad Caverns National Park to park personnel and visitors, October 1998. Co-presenter: P.J. Boston.
- Research in Cueva de Villa Luz, Tabasco, Mexico and Lechuguilla Cave. Oral Presentation at the Winter Technical Regional of the Southwest Region of the National Speleological Society, December, 1998.
- Microbes in Caves. Oral Presentation for the Restoration Workshop at the National Speleological Society, Annual Meeting held June 23-27, 1997, Sullivan, MO.
- Life in Caves. Oral Presentation to the Albuquerque Kiwanis Club, January 22nd, 1997.
- Shedding Light on a Dark Topic: Cave Ecology. Lecture given at the faculty acknowledgment reception, September 5th, 1996, UNM General Library.

- Life in the twilight zone: Lava tube ecology. Presentation to the Los Amigos group of El Malpais National Monument, March 1996.
- Cave ecology. Talk for 7th grade females to inspire them to go into science, February 1996.
- Research in Carlsbad Cavern. General Library Brown Bag Series, June 1989,

## **Course Guest Lectures**

- Geomicrobiology of Caves. Biology 558/E&PS 558. December 2003.
- Cave Ecosystems. Biology 514, Ecosystems. September 2003.
- Techniques in Environmental Microbiology. Biology 351, Microbiology. April 2003.
- Biodiversity in Caves; Caves and Society; Geochemistry of Caves. Guest lectures in three courses at Earlham College, Richmond, IN, 24-25 March, 2003.
- Working with the Media. Science Writing course, English. February 2003.
- Cave Microbiology. Microbial Ecology, Biology. February 2003.
- Demonstration and lecture of molecular microbial ecology of caves. Presentation to the Natural History class from the Gallup Campus of UNM, April 2002.
- Geomicrobiology of caves. Geomicrobiology, Biology 458, University of New Mexico, December 2001; December 2002.
- Microbial Biodiversity of caves. Microbial Evolution and Diversity, Biology 402/502, University of New Mexico, December, 2001.
- Geology of Carlsbad Caverns National Park. E&PS 110, Geology of the National Parks, November 2001.
- Biodiversity in caves. A guest lecture in the Honors Biodiversity class at the University of New Mexico, May 1999; September 2002.
- Life in the twilight zone - Lava tube ecology. Presentation to John Rogers' class, Natural History of the Southwest, and the community, UNM Valencia Campus, October, 1999.
- Extracting DNA from cave sediments. Presentation and demonstration for Ursula Shepherd's General Honors Program class, Hello Dolly, The Science of Cloning, October, 1999.
- Shedding new light on a dark topic: Cave ecology. Guest lecture in Groundwater Ecology, Department of Biology, UNM, February 1996.
- Searching the biological literature. Biology Technical Writing, University of Massachusetts, Amherst. October 1994.

## Manuscript Reviews

Manuscript reviews for *Geomicrobiology Journal* (1998, 2001-2003); *Geology* (2003); *Planetary and Space Science* (2003); *Microbiology* (2002); *EUG9 Symposium on Hydrogeology of Crystalline Rocks*, (Kluwer, 1999); *Journal of the North American Benthological Society*, (1996); *Medical Information*, 1990-1994.

## Interviews with the Press

- Tweti, Mira. May, 2004. Cave Slime Sisters. *Readers Digest*.
- Niio, Genya. 2003. Filming a documentary in Cueva de las Sardinias for the Japanese Broadcasting Company (NHK).
- Summer 2003. American Society for Microbiology. *Microbe World*. Interview on the recovery of nitrogen cycle bacteria from the Cerro Grande burned soils research project.
- May 2003. Jensen, Mari N. Report: Forest fires foster community change in nitrogen-fixing bacteria. *BioMedNet*. One of six featured research presentations from the first day of the American Society of Microbiology annual meeting in Washington, D.C. on the BioMedNet site.
- Clay, Diane. 15 July 2003. *The Oklahoman*.
- Christy. *Super Science* (kids' magazine published by Scholastic Publishers).
- Snottites. 15 August 2003. American Association for the Advancement of Science website audio story.
- . Secret Life of Caves. BBC. 4 April 2003. A remake of the NOVA episode.
- Hadington, Evan and Holt, Sarah. October 1, 2002. Mysterious life of caves. *NOVA*.
- Hadington, Evan. October 2002. Subterranean Surprises. *Smithsonian*. 33(7):68-74.
- Turner, Pamela. the Cave that Microbes Built. Fall 2002. *California Wild* 55(4): .
- Parker-Stevens, Victoria. April 28, 2002. Researcher seeks out Caverns creepy-crawlies. *Carlsbad Current Argus*.
- Bernat, Valerie. 2002. Cave Gunk. *Wild Outdoor World (WOW)* 6(1): 32-35
- Martin, Bob. February 2002. Channel 13 (KQRE). News piece on cave conservation.
- Clark, Alice. Pioneer Productions, BBC. December 2001. Filming in Cueva de Villa Luz, Tabasco, Mexico, for a fall 2002 program on the origin of life.
- BBC. Fall 2001. "Final Frontier". Interview with Penny Boston, and scenes of Boston, Spilde, and Northup doing research in Four Windows Cave, El Malpais National Monument.

- Grossman, Dan. 2001. Astrobiology. *DNA Files*. National Public Radio. Won the Alfred I. duPont-Columbia University Award, the Clarion Award, and the American Institute of Biological Sciences Broadcast Award.
- Krajick, Kevin. September 28, 2001. Cave biologist unearths buried treasure. *Science*. 293:2378-2381.
- Ryo. August 16-17, 2000. "Year 2000, Super Summer Adventure Series, Amazing Underground". (hour-long documentary on caves). NHK Broadcasting Company (Japan), produced by "FORTIES-NHK INFORMATION NETWORK".
- Racine, Marty. 2000. Life in a cave: trying to unlock the secrets of a microbial world in Carlsbad Caverns. *Houston Chronicle*: Texas, July 16, 2000: 8-13.
- Crane, Candace. 2000. *Carlsbad Caverns National Park: Worlds of Wonder*. Carlsbad, NM: Carlsbad Caverns Guadalupe Mountains Association. 55pp. Discusses research of various team members.
- Spilde, M.N. and Northup, D.E. 2000. Our scanning electron micrograph appeared on the cover of the *Journal of Cave and Karst Studies*, v. 62(1):cover.
- Getz, David. October 2000. *Muse Magazine*.
- David, Leonard. March 15, 2000. Search for life takes two women to the depths. *Space.com: People*.
- Mauro-Noon, Carol. 2000. Interview for a companion piece for the kids print magazine that accompanies the Space.com website.
- Zanes, Tom. January, 2000. Leave No Trace. 15 minute video produced for the U.S. National Forest Service on low-impact caving; brief interview with Northup.
- Achenbach, Joel. 2000. Life Beyond Earth. *National Geographic*. v.197(1): 24-51. (Picture of Boston, Northup, and Spilde sampling in Villa Luz, Tabasco, Mexico, and excerpts from interviews with Penny Boston.)
- Cole, Julia. October, 1999. Treasures in a pristine cave. *Geotimes* 44(10): 6-7.
- Gonzales, Carolyn. September 20, 1999. Northup caves for national media. *The University of New Mexico Campus News*. v. 35(5):3.
- Anon. September 2, 1999. *UNM News Minute* no. 1. News item about the NOVA filming.
- Taylor, Michael Ray. July 27, 1999. U.S. cave yields odd microbes. *Discovery Channel Online*, Discovery News Brief. Web article with pictures of myself and others of our team, describing our research.
- Hose, Louise. April, 1999. Cave of the sulfur eaters - Despite poisonous gases and passageways lined with acidic slime, a cave in southeastern Mexico teems with life. *Natural History* 108(3):54-61.
- Cannell, Michael. March 22, 1999. Rock eaters. *Science World*. pp. 15-17.

- Ferguson, Chaka. January 31, 1999. UNM team on ‘Mars probe’: Caves’ bacteria may indicate life exists on planet. *Albuquerque Journal*. B5. Carried by the Associated Press and appeared in papers across the U.S.
- Taylor, Michael Ray. 1999. *Dark Life*. New York: Scribner.
- Bauer, Paula. Winter, 1998. Cave corrosion residues: Anybody home? *Canyons & Caves*, no.11: 4-5.
- Dano, Mike. November 23, 1998. Mysterious organism eats cave walls, vexes scientist. *Daily Lobo*, v. 103(64): 1,5.
- Weicker, Jacqueline. August 27, 1998. Strange new underground world. *Albuquerque Tribune*.
- Lewis, David. August 2, 1998. *CNN-Time Newsstand*. Interview with Boston and Northup, 10-minute segment.
- Chandler, David L. August 24, 1998. Cave dwellers. *The Boston Globe*: C1, C3.
- Pain, Stephanie. June 6, 1998. Acid house. *New Scientist*. 2137: 42-46.
- Charles Petit, San Francisco Chronicle for story in US News and World Report, January 1998.
- Haddrill, Marilyn. December 21st, 1997. Light in the Darkness: NM cave’s ‘bugs’ tease with insight. *The Dallas Morning News*: 56A.
- Fleck, John. October 27, 1996. Hunting N.M. clues to life on Mars. *Albuquerque Journal*, A1,A16.
- CNN. 1993. Filming about cave biology in Slaughter Canyon Cave.

## Service

### National

- *Journal of Cave and Karst Studies* Advisory Board Member 2001–2003.
- Guest Editor for a special issue of *Geomicrobiology Journal*, vol.18(3), August, 2001, on Geomicrobiology of Caves.
- Moderator of a session at the International Subsurface Microbiology meeting, Vail, Colorado, 1999.

## **University and Non-Library**

- Tenure Committee, Dr. Ursula Shepherd, General Honors Program, 1999–
- Molecular Microbial Ecologist Faculty Search Committee, Department of Biology, UNM, Fall 1999–Spring 2000.
- Research Day 2000 arrangements committee, Department of Biology, UNM, 2000.
- Local arrangements committee for the Southwestern Association of Biology annual meeting at Ghost Ranch, NM, 1999.
- Microbiology Faculty Search Committee, Department of Biology, UNM, 1999.
- UNM Long Range Planning Committee (1988–1994, Vice-Chair, 1993).

## **General Library**

- General Library Dean's Review Committee, Fall 2000–Spring 2001.
- Sabbatical Review Committee, 1999–2000.
- Personnel Action and Review Committee 1989–1990.
- Promotion and Tenure Committee, General Library, 1990–1992.
- Government Documents Librarian Search Committee, 1989.
- Microcomputer Coordinators Committee, 1988.
- Research and Publications Committee, September 1988–August 1989.
- Earlier committee work available upon request.

## **Community Service**

- Took the Boy Scouts to the lava tubes to learn about caves.
- Back-country inventories of invertebrates for the National Park Service, Carlsbad Caverns National Park, 1992-1993.
- Faculty Mentor for Joan Griffiths, Systems, UNM General Library.
- Jury Duty, Metropolitan Court, Bernalillo County, 18 October-29, 1999.

## **Current Professional Associations**

National Speleological Society  
Cave Research Foundation  
Sigma Xi

## Sabbatical 1994-1995; 2002

- Five-month experience in the laboratory of Dr. Cheryl Kuske, Biosciences Division, Los Alamos National Laboratory, working on the molecular characterization of the changes in nitrogen bacteria composition in burned soils from the Cerro Grande fire. March-July, 2002.
- Three-month experience at the laboratory of Dr. Norm Pace, Indiana University, working on the molecular characterization of the microbial community of Parker Cave, Kentucky and Lechuguilla Cave.
- Visits to collections of speleology books in New York, Tennessee, Alabama, Australia, and Hawaii for the purposes of preparing the Guide to Speleological Literature.
- Two-month experience in the laboratory of Dr. Larry Mallory at the University of Massachusetts, Amherst, conducting a FAME analysis of bacteria present

## Recent Conferences Attended

See also Delivered Papers at Professional Meetings section above for other conferences attended.

International Subsurface Microbiology, Copenhagen, Denmark, September 7-13, 2002.

American Society for Microbiology, Salt Lake City, Utah, 19-24 May, 2002.

Earth System Processes - Global Meeting, June 24-28, 2001

American Society for Microbiology, Orlando, Florida, May 2001.

National Speleological Society Annual Meeting, Elkins, WV, June 26-30, 2000. Bathurst Carbonate Meeting July 13th-15th, 1999 Cambridge, UK.

International Symposium on Microbial Ecology in Halifax, Canada, August 1998.

Annual Meeting of the National Speleological Society, Sewanee, TN, August 1998.

Geological Society of America, Salt Lake City, Utah, October, 1997.

Special Karst Symposium, American Association for the Advancement of Science, Annual Meeting, Baltimore, Maryland, February 13th, 1996.

Listings of prior conferences attended are available upon request.

## Continuing Education

Ph.D. course-work 1996-1999.

Molecular Evolution Workshop, Woods Hole Marine Biological Laboratory, 2 weeks, August, 1994.

Microbial Diversity, Woods Hole Marine Biological Laboratory, 7 weeks, June-July, 1993.

Dialog, STN, BRS, Biosis, and INSPEC online training workshops, 1988-

07/92 MEDLARS Refresher

02/92 Introduction to INSPEC Searching

01/92 Dialog's How to Search for Computer Information

01/92 Dialog's How to Search for Environmental Information

11/91 Dialog's How to Find Physical Properties

07/91 Dialog Refresher-Update 91

06/91 STN's Physics and Engineering Databases

06/91 STN's Property Data  
06/91 STN's Update  
05/91 Dialog's Teach the Teacher  
03/91 Dialog's Quick Reference  
10/90 dialog's Science and Technology Seminar  
04/90 BRS Searching  
04/90 Dialog Update '89  
12/89 Dialog's How to verify an Expert or Consultant  
12/89 Dialog's How to Locate Statistics  
12/89 Dialog's How to Avoid Common Search Mistakes  
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