

James C. Brower

BIRTHDATE: 27 JUNE 1934

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EDUCATION: University of Wisconsin
1961-63, Geology with minor in oceanography
Ph.D., 1964

The American University
1957-61, Geology with minor in biology
M.S., 1961
B.S. (Magna cum laude), 1959

Orlando Jr. College, Orlando Florida
1953-54 Associate of Arts, 1954

PROFESSIONAL EXPERIENCE:

Syracuse University
Emeritus Professor of Geology
1995-Present

Syracuse University
Professor of Geology
1974-1995

Syracuse University
Associate Professor of Geology
1964-1974

Syracuse University
Assistant Professor of Geology
1964-67

COURSES TAUGHT:

Principles of paleontology
Invertebrate paleontology
Advanced invertebrate paleontology
Quantitative paleoecology
Evolution as seen in the fossil record (5 week module in a basic course)
Geostatistics
Numerical Geology
Stratigraphy
Historical Geology

MEMBERSHIPS:

Paleontological Society
Society of Systematic Zoology
Society of Economic Paleontologists and Mineralogists
Paleontological Research Institute
International Paleontological Union
Paleontological Association
Sigma Xi
International Association for Mathematical Geology
Assistant Editor of Mathematical Geology (1971-1972)
Editorial Correspondent for Mathematical Geology (1972-1976)
Editorial Board for Computers & Geosciences (1981-present)
New York State Geological Association Coordinator for 1964 meetings
Head of Biostratigraphy Working Group for International
Geological Correlation Program (UNESCO) Project 148
Voting Member of International Commission on Stratigraphy (ICS)

HONORS, GRANTS, ETC.:

Assistant Editor of Mathematical Geology (1971-1972)
Editorial Correspondent for Mathematical Geology (1972-1976)
Editorial Board for Computers & Geosciences (1981-present)
New York State Geological Association Coordinator for 1964 meetings
Head of Biostratigraphy Working Group for International
Geological Correlation Program (UNESCO) Project 148
Voting Member of Committee on Quantitative Stratigraphy for International
Commission on Stratigraphy (ICS) of International Geological Union
Invited member of Panel on Geochronology of the National Research
Council Committee on Status and Research Objectives in the Solid Earth
Sciences
Member of Organizing Committee for Spring 1990 Meeting of the
Northeastern Section of the Geological Society of America
Invited as a Principal Discussant at the Workshop on Fossil Crinoids held at
the International Geological Congress in Washington D.C. in 1989
One of five best papers in Journal of Paleontology in 1987 for "The relations
between ontogeny, phylogeny and functional morphology in some
calceocrinid crinoids."
Best paper award in Journal of Paleontology for 2007
Grants from National Science Foundation, Petroleum Research Fund of the
American Chemical Society, Senate Research Committee of Syracuse
University, International Geological Correlation Program
Reviewer of numerous articles for Journal of Paleontology, Paleobiology,
Mathematical Geology, Computers & Geosciences
Reviewer of Research proposals for National Science Foundation and American
Chemical Society

TEACHING PHILOSOPHY:

My philosophy is simply that teaching and research, problem evolving and solving, must be integrated into a single framework. In order to be a geologist, the student needs a thorough grounding in basic geological facts, principles, theories, hypotheses and methods. Furthermore, the students must have experience in application of the principles, etc., to practical problems and in developing and testing his or her own observations and ideas. This is best accomplished through having students do research, either within the framework of a lecture-laboratory course or special research courses such as the thesis. The cornerstone of all my courses is the research project or projects. Durations of such projects range from several weeks to an entire semester but the magic word remains research.

In predominantly undergraduate courses, I have developed research projects, graduated to the level of competency of the students. For example, in the current paleoecology project in the Principles of Paleontology course, the students work with *Eurypterus remipes remipes* DeKay, a common Silurian eurypterid from New York. This includes determination of the environment in which the animals lived, life table analysis (death rates, survivorship, etc.), and reconstruction of the living habits and functional morphology of the animal. The stratigraphy class is researching the post-Pleistocene stratigraphy of a local embayment of Lake Oneida. This requires measuring stratigraphic sections, ascertaining the relationships in time and space of the various sediments, working out depositional environments and the sequence of events involved. In graduate courses the students are expected to design their own research problems with close supervision of the instructor. At all levels, the research projects are comparable to those which would be solved by professionals although the data may be condensed to allow solutions to be developed in a short time. Within the past decades, geology has experienced a quantitative revolution. It is now essential for all students to have the ability to understand and use numbers, mathematics, and statistics aided by a computer. Consequently all of my courses emphasize a quantitative approach.

RESEARCH INTERESTS:

I was originally trained as a classical and morphologically oriented paleontologist with specialization in Paleozoic crinoids. Soon after receiving the Ph.D. in 1964 from the University of Wisconsin, I gradually became interested in more biological aspects of paleontology, especially in the reconstruction of functional morphology, the study of ontogeny and evolutionary sequences, and in the paleoecology of Paleozoic crinoids.

Roughly in 1967 or 1968, I became aware that statistical and mathematical methods could be of great use in solving problems in paleobiology. Consequently I began to systematically read and apply statistics, beginning with simple univariate and bivariate statistics and culminating in multivariate methods, such as factor analysis and discriminant analysis, a study which is still continuing. Thus far I have mainly applied statistical methods to studies of ontogeny, functional morphology and phylogeny, although several papers treat quantitative aspects of paleoecology. The acquisition of competence in statistics has allowed me to expand my research to various fossil groups aside from crinoids; at present I have either published or am working on statistical studies on bivalves, ammonites, eurypterids, brachiopods, vertebrates and trilobites, in addition to crinoids.

Within recent years, I have expanded my geomathematics to the development of new techniques. One of these is a mathematical model to simulate swimming in crinoids which can be used to predict swimming ability in living crinoids and to determine whether or not fossil crinoids possessed the capacity to swim. Another project deals with quantitative biostratigraphic correlation in which various algorithms are being structured for different types of correlation such as time correlation or to establish the physical continuity of a particular biofacies in time and space. The multivariate analysis of size and shape represents a third line of research in numerical paleontology. In conjunction with the study of size and shape, research on the use of coordinates of homologous points quantification of Thompsonian transformation grids has and is being investigated.

A completed study of allometry and flight performance of pterosaurs combined two of my long-term interests, namely the statistics of size and shape and low speed aerodynamics. I have initiated projects on gradients and classification of fossil communities in the local Devonian rocks.

After a hiatus of some years, my research was redirected toward Paleozoic crinoids. A series of papers has treated the relationships between ontogeny, phylogeny and functional morphology in calceocrinid crinoids. The unique life style of these animals with their recumbent stems that ran along the substrate and a moveably hinged crown makes them especially suited for such studies. Basically, the unusual morphology makes allows paleobiological questions to be posed and answered. This philosophy can and should be extrapolated to paleoecology. Clearly, the examination of faunas characterized by unusual preservation and/or occurrence in unusual environments can provide much paleoecological information. In this vein, I am now engaged in a long-term investigation of the paleoecology of some exquisitely preserved echinoderm assemblages from the Upper Ordovician of the midcontinent. The communities are dominated by suspension feeding echinoderms. Catastrophic burial resulted in the preservation of many complete adult and juvenile specimens. Consequently, it is possible to infer the elevations relative to the substrate at which the individuals lived, estimate the sizes of food particles taken, and infer their methods of food capture by extrapolating from modern crinoids and other echinoderms and by applying filtration theory. The material encourages reconstruction of ecological structure, both in the context of adults and ontogenetic sequences. Inasmuch as some of the taxa are new, it is necessary to describe the species and determine their phylogenetic affinities.

I am also interested in methods of integrating quantitative methods into geology and paleontology in the classroom.

At present my research interests are best described as dealing with problems of paleontology, paleobiology, paleoecology and biostratigraphy which can be approached quantitatively.

PUBLICATIONS:

- 1964a Evolution and classification of primitive actinocrinitids. Ph.D. dissertation, University of Wisconsin, 120 pp.
- 1964b In conjunction with N.E. Chute. Stratigraphy and structure of Silurian and Devonian strata in the Syracuse Area, Trip C. *In* New York State Geological Association, Guidebook for 36th Annual Meeting, pp. 90-101.
- 1964c In conjunction with N.E. Chute. Stratigraphy of the Hamilton Group in the Syracuse area, Trip E. *In* New York State Geological Association, Guidebook for 36th Annual Meeting, pp. 102-108.
- 1965a Functional morphology and conservative characters in *Steganocrinus*. (Abstract), Geological Society of America, Special Paper 82, p. 21.
- 1965b The genus *Steganocrinus*. *Journal of Paleontology*, v. 39, pp. 773-793.
- 1966 Functional morphology of Calceocrinidae with description of some new species. *Journal of Paleontology*, v. 41, pp. 613-634.
- 1967 The actinocrinitid genera *Abactinocrinus*, *Aacocrinus* and *Blairocrinus*. *Journal of Paleontology*, v. 41, pp. 675-705.
- 1968a Review of new Permian crinoid fauna from southern Nevada, by N.G. Lane and G.D. Webster. *Journal of Paleontology*, V.42, p. 245.
- 1968b Growth patterns in primitive Ordovician camerate crinoids. (Abstract), Geological Society of America, Special Paper 115, pp. 25, 26.
- 1969a Essay review of Treatise on invertebrate Paleontology, Part S, Echinodermata 1, ed. by R.C. Moore. *In* *Journal of Paleontology*, v. 43, pp. 843-848.
- 1969b Chapter 12, Crinoids. *In* E.J. McKee and R.C. Gutshick (editors), The history of the Redwall Limestone of northern Arizona, Geological Society of America, Memoir 111, pp. 475-542.
- 1970 Crinoid fauna of the Girardeau Limestone. (Abstract), Geological Society of America, Abstracts with programs for 1970, pp. 734-736.
- 1972a Review of statistical analysis of geological data, volume 2, by G.A. Koch, Jr. and R.F. Link. *Journal of Geological Education*, v. 20, pp. 214-215.
- 1972b Review of statistical analysis of geological data, volume 2, by G.S. Koch, Jr. and R.F. Link. *Journal of International Association for Mathematical Geology*, v.4, pp.359-360.
- 1973a Ontogeny of a Miocene pelecypod. *Journal of International Association for Mathematical Geology*, v. 5, pp. 73-90.
- 1973b Crinoids from the Girardeau Limestone (Ordovician). *Palaeontographica Americana*, v.7, pp. 46, pp. 261-499.
- 1974a Upper Ordovician xenocrinids (Crinoidea, Camerata) from Scotland. University of Kansas Paleontological Contributions, Paper 67, 25 pp.
- 1974b In conjunction with Julia Veinus. Middle Ordovician crinoids from southwestern Virginia and eastern Tennessee. *Bulletin of American Paleontology*, v.66, no. 283, 125 pp.
- 1974c In conjunction with H.E. Andrews, S.J. Gould and R.A. Reymont. Growth and variation in *Eurypterus remipes* DeKay. *Bulletin*, Geological Institute, University of Uppsala, n.s., v. 4, pp. 81-114.
- 1974d Ontogeny of camerate crinoids. University of Kansas, Paleontological Contributions, Paper 72, 53 pp.

- 1974e In conjunction with Julia Veinus. The statistical zap versus the shotgun approach. *Journal of International Association for Mathematical Geology*, v.6, no.4, pp. 311-332.
- 1975a In conjunction with Julia Veinus. Ontogeny of *Hybocrinus punctatus* (Miller and Gurley), an Ordovician crinoid. *Journal of the International Association of Mathematical Geology*, v.7, no. 2, pp. 129-147.
- 1975b Evolution of the Melocrinitidae. (Abstract), Geological Society of America, Abstract volume for northeastern section, p. 31.
- 1975c In conjunction with O.B. Nye, Jr., and E.E. Wilson. Hitchhiking clams in the Marcellus Sea. *Bulletin of American Paleontology*, v. 67, pp. 287-298.
- 1975d Review of statistical and data analysis in geology, by J.C. Davis. *Journal of the International Association of Mathematical Geology*, v. 7, no. 3, pp. 278-279.
- 1975e Silurian crinoids from the Pentland hills, Scotland. *Paleontology*, v. 67, pp. 287-298.
- 1975f In conjunction with P.Y. Berthou and R.A. Reyment. Morphometrical study of Choffat's vascoceratids from Portugal. *Bull. Geol. Inst., Univ. Uppsala, n.s.*, v. 6, pp. 75-83.
- 1976a A statistically oriented approach for teaching principles of paleontology. *Computers & Geosciences*, v.2, pp. 33-40.
- 1976b *Promelocrinus* from the Wenlock at Dudley. *Palaeontology*, v. 19, pp. 651-679.
- 1976c In conjunction with L.E. Schafer and O.B. Nye Jr. The Influence of spatial abilities, aptitudes and attitudes, on success in geology - a progress report. *Computers & Geosciences*, v.2, p. 269-273.
- 1977 Calceocrinids from the Bromide Formation (Middle Ordovician) of southern Oklahoma. *Oklahoma Geo. Surv., Circ. 78*, 28 p., 4 pls.
- 1978a Evolution of the Melocrinitidae. *Thalassia Jugoslavica*, v. 12, no. 1, pp. 41-49; Proceedings volume for Second International Conference on Echinoderms.
- 1978b In conjunction with C.R. Clement and Julia Veinus. Multivariate analysis of allometry using morphometric measurements. *In* Recent advances in geomathematics - an international symposium, edited by D.F. Merriam, Pergamon Press, pp. 61-80.
- 1978c In conjunction with O.B. Nye Jr. and nine others. Faunal assemblages in the Lower Hamilton Group in Onondaga County, New York. *New York State Geol. Assoc., Guidebook for 50th Ann. Meeting*, pp. 104-123.
- 1978d In conjunction with Julia Veinus. Multivariate analysis of allometry using point coordinates. *Jour. Paleont.*, v. 52, no.5, pp. 1037-1053.
- 1978e In conjunction with Julia Veinus. Middle Ordovician crinoids from the Twin Cities area of Minnesota. *Bull. American Paleont.*, v. 74, no. 304, pp. 372-506.
- 1978f In conjunction with S.A. Millendorf and T. S. Dyman. A comparison of methods for the quantification of assemblage zones. *Computers & Geosciences*, v.4, no. 3, pp. 229-242.
- 1978g In conjunction with S.A. Millendorf and T.S. Dyman. Methods for the quantification of assemblage zones based on multivariate analysis of weighted and unweighted data. *Computers & Geosciences*, v.4, no. 3, pp. 221-227.
- 1978h In conjunction with S. A. Millendorf. Quantitative Biostratigraphic Correlation. *Computers & Geosciences*, v.4, no.3, pp. 217-220.
- 1978i In conjunction with S.A. Millendorf, G.S. Srivastava and T.S. Dyman. A FORTRAN program for calculating binary similarity coefficients. *Computers & Geosciences*, v.4, no.3, pp. 307-311.

- 1979a Postlarval ontogeny of fossil crinoids, camerates. *Treatise on Invertebrate Paleontology, Part T. Echinodermata 2*, pp. T244-263.
- 1979b In conjunction with S.A. Millendorf and T.S. Dyman. Methods of quantitative biostratigraphy with emphasis on those applicable to assemblage zones. *West Virginia Geol. Survey, Circular C-15*, pp.3-5.
- 1979c In conjunction with J.M. Cubitt, J. Veinus and M. Morton. Principal-components analysis, factor analysis, and point coordinates in the study of multivariate allometry. *In Geomathematical and petrophysical studies in sedimentology*, edited by D.F. Merriam, Plenum Press, pp. 245-266.
- 1980a Size and shape in pterosaurs. *Geol. Soc. America. Abstracts with Programs*, v. 12, no. 2, p. 26.
- 1980b Flight performance of pterosaurs. *Geol. Soc. America. Abstracts with Programs*, v. 12, no.7, p. 393.
- 1980c Pterosaurs: how they flew. *Episodes*, v. 1980, no. 4, pp. 21-24.
- 1981a In conjunction with Julia Veinus. Allometry in pterosaurs. *Univ. of Kansas Paleont. Contrib.*, Paper 105, pp. 1-32.
- 1981b Quantitative biostratigraphy, 1830-1980. *In Computer applications in the Earth Sciences*, edited by D.F. Merriam, Plenum Press, pp. 63-103.
- 1981c *Nyctosaurus*, a reptilian analogue of a frigate bird. *Geol. Soc. America, Abstracts with Programs*, v. 13, no. 7, p. 417-418.
- 1982a In conjunction with F.P. Agterberg, F.M. Gradstein, W. Schwarzacher, and J.E. Van Hinte. New concepts and methods in stratigraphy. *Course Manual for Canadian Society of Petroleum Geologists, Calgary*.
- 1982b Phylogeny of primitive calceocrinids. *In Echinoderm faunas from the Bromide Formation (Middle Ordovician) of Oklahoma*, edited by James Sprinkle, University of Kansas Paleontological Contributions, Monograph 1, pp. 136-144.
- 1982c In conjunction with Julia Veinus. Long-armed cladid inadunates. *In "Echinoderm faunas from the Bromide Formation (Middle Ordovician) of Oklahoma*, edited by James Sprinkle, University of Kansas Paleontological Contributions, Monograph 1, pp. 135-144.
- 1982d In conjunction with W. A. Burroughs. SER, a FORTRAN program for the seriation of biostratigraphic data. *Computers & Geosciences*, v. 8, no. 2, p. 137-148.
- 1982e The aerodynamics of an ancient flying reptile. *Syracuse Scholar*, v. 3, pp. 45-57.
- 1982f In conjunction with W.A. Burroughs. A simple method for quantitative biostratigraphy. *In Cubitt, J.M., and Reymont, R.A. (editors), Quantitative stratigraphic correlation*, John Wiley & Sons, Ltd.
- 1982g Quantitative biostratigraphy, 1830-1980. Reprinted from Brower, 1981b Appalachian Basin Industrial Associates Program for Spring Meeting, 41 p.
- 1983a The aerodynamics of *Pteranodon* and *Nyctosaurus*, two large pterosaurs from the Upper Cretaceous of Kansas. *Jour. Vertebrate Paleontology*, v. 3, no. 2, pp. 84-124.
- 1983b Models for the relative biostratigraphic values of fossils. *Geol. Soc. Amer.*, Abstracts with Programs, v. 15, no. 6, p. 534.
- 1983c In conjunction with M.E. Hohn. Quantitative biostratigraphic correlation. *Geol. Soc. America, Abstracts with Programs*, v. 15, no. 6, p. 597.
- 1983d In conjunction with H.L. Strimple. Ordovician calceocrinids from northern Iowa and southern Minnesota. *Jour. Paleontology*, v. 57, no. 6, p. 1261-1281.
- 1984a The relative biostratigraphic values of fossils. *Computers & Geosciences*, v. 10, no. 1, p. 111-131.
- 1984b Quantification of the index fossil concept. *Appalachian Basin Industrial Associates Program for Spring Meeting*, p. 209-256.

- 1984c The relations between ontogeny, phylogeny and functional morphology in calceocrinid crinoids. *Geol. Soc. America, Abstracts with Programs*, v. 16, no. 6., p. 15.
- 1985a An exercise in quantitative biostratigraphy. *Compass*, v. 62, no. 3, p. 194-204.
- 1985b The index fossil concept and its application to quantitative biostratigraphy. Chapter II.1. *In* Gradstein, F.M., Agterberg, F.P., Brower, J.C., and Schwarzacher, W.S., *Quantitative stratigraphy*, D. Reidel Pub. Co., p. 43-64.
- 1985c Multivariate analysis of assemblage zones. Chapter II.2. *In* Gradstein, F.M., Agterberg, F.P., Brower, J.C., and Schwarzacher, W.S., *Quantitative stratigraphy*, D. Reidel Pub. Co., p. 65-94.
- 1985d Archaeological seriation of an original data matrix. Chapter II.3. *In* Gradstein, F.M., Agterberg, F.P., Brower, J.C., and Schwarzacher, W.S., *Quantitative stratigraphy*, D. Reidel Pub. Co., p. 95-108.
- 1985e In conjunction with D.T. Bussey. A comparison of five quantitative techniques for biostratigraphy. Chapter II.9 *in* Gradstein, F.M., Agterberg, F.P., Brower, J.C., and Schwarzacher, W.S., *Quantitative Stratigraphy*, D. Reidel Pub. Co., p. 279-306.
- 1986a Benthic communities in the Lower Hamilton Group (Middle Devonian) in central New York. *Geol. Soc. America, Abstracts with Programs*, 1986, v. 18, no. 1, p. 7.
- 1986b In conjunction with O.B. Nye, Jr. Fossil communities in the lower Hamilton Group near Syracuse, New York. *Appalachian Basin Industrial Associates, Program for Spring Meeting*, 1986, p.97-132.
- 1986c Quantitative community paleoecology. *Proceedings, Fourth North American Paleontological Convention*, Boulder, Colorado.
- 1986d Ontogeny and functional morphology of two Ordovician calceocrinids. *Proceedings of the Fifth International Echinoderm Conference*, Galway, Ireland, p. 13-18.
- 1987a Growth of the food-gathering system in calceocrinid crinoids. *Geol. Soc. America, Abstracts with Programs*, 1987, v. 19, no. 4, p. 191.
- 1987b Middle Ordovician crinoid assemblages from the Twin Cities area of Minnesota. *Geol. Soc. America, Abstracts with Programs*, v. 19, no. 4, p. 191.
- 1987c In conjunction with T.J. Frest and D.R. Kolata. Biostratigraphy and biogeography of Middle-Upper Ordovician echinoderms of the upper Mississippi Valley region. *Geol. Soc. America, Abstracts with Programs*, v. 19, p. 198.
- 1987d The Middle Ordovician crinoid fauna of the Twin Cities area, Minnesota. *Minnesota Geological Survey, Report of Investigations* 35, p. 177-178.
- 1987e In conjunction with T.J. Frest and D.R. Kolata. Upper Mississippi Valley Champlainian and Cincinnati echinoderms. *Minnesota Geological Survey, Report of Investigations* 35, p. 179-181.
- 1987f Multivariate analysis in community paleoecology. *The Compass*, v. 64, no. 2, p. 89-102.
- 1987g In conjunction with J.A. Thomson and K.M. Kile. The paleoecology of a Middle Devonian regression. *Abstract and Program Volume for the Second International Symposium on the Devonian System*, p. 49.
- 1987h Allometry of the food-gathering system in calceocrinid crinoids. *Abstracts of the Sixth International Echinoderms Conference*.
- 1987i The relations between ontogeny, phylogeny and functional morphology in some calceocrinid crinoids. *Journal of Paleontology*, v. 61, no.5, p. 999-1032.
- 1987j Seriation of biostratigraphic data. *Society of Economic Paleontologists and Mineralogists, Research Conference*, Houston, Texas, December, 1987, 15 p.

- 1987k Seriation of an original data matrix as applied to biostratigraphy. Fourth South American Symposium of Cogeodata, Abstracts with Program, p. 21-22.
- 1988a In conjunction with K.M. Kile. Seriation of an original data matrix as applied to paleoecology. *Lethaia*, v. 21, p. 79-93.
- 1988b Paleoecology of a Middle Ordovician echinoderm fauna. Fifth International Symposium on the Ordovician System, Program and Abstracts, p. 15.
- 1988c Allometry of the food-gathering system in calceocrinid crinoids. Proceedings of the Sixth International Echinoderm Conference, Victoria, p. 71-80.
- 1988d In conjunction with E. P. Metzger. Quantified assemblage zones: a case study in nearshore facies from the lower Cretaceous of the western United States. *In* Recent Advances in Stratigraphic Correlation, edited by F. P. Agterberg and C. N. Rao, Hindustan Publishing Corporation, Delhi, India, p. 37-46.
- 1988e Quantification of assemblage zones for the Late Cretaceous Greenhorn cycle of sedimentation in the western interior of the United States. *In* Recent Advances in Stratigraphic Correlation, edited by F. P. Agterberg and C. N. Rao, Hindustan Publishing Corporation, Delhi, India, p. 63-77.
- 1988f Quantitative biostratigraphy - past, present and immediate future. *In* Recent Advances in Stratigraphic Correlation, edited by F. P. Agterberg and C. N. Rao, Hindustan Publishing Corporation, Delhi, India, p. 101-108.
- 1988g Ontogeny and phylogeny in primitive calceocrinid crinoids. *Journal of Paleontology*, v. 62, p. 917-934.
- 1989a In conjunction with J.A. Thomson and K.M. Kile. The paleoecology of a Middle Devonian regression. Canadian Society of Petroleum Geologists, Memoir 14, Devonian of the World, Proceedings of the Second International Symposium on the Devonian System, Vol. III, p. 243-256.
- 1989b Trophic structure of a Middle Ordovician echinoderm fauna. Abstracts for the 28th International Geological Congress, p. 1-206.
- 1990a The paleoecology of food-gathering in two cupulocrinids from the Middle Ordovician of Middle North America. Geological Society of America Abstracts Volume for 1990, v. 22, no. 2, p. 6.
- 1990b In conjunction with W. B. Newman and C. R. Newton. Faunal succession: discrete or gradational? An example from the Middle Devonian Hamilton Group of central New York. Geological Society of America Abstracts Volume for 1990, v. 22, no. 2, p. 59.
- 1990c Ontogeny and phylogeny of the dorsal cup in calceocrinid crinoids. *Journal of Paleontology*, v. 64, no. 2, p. 300-318.
- 1990d In conjunction with D. F. Merriam. Geological map analysis and comparison by several multivariate algorithms. Geological Survey of Canada Paper 89-9, p. 123-134.
- 1990e A case study for comparison of some biostratigraphic techniques using Paleogene alveolinids from Slovenia and Istria. Geological Survey of Canada Paper 89-9, p. 407-416.
- 1990f In conjunction with Ding Yuan. Error effects and error estimation for graphic correlation in biostratigraphy. Geological Survey of Canada Paper 89-9, p. 427-438.
- 1991a The life and times of *Ectenocrinus simplex*, an Ordovician crinoid. Geological Society of America Abstracts Volume for 1991, v. 23, no. 1, p. 11.
- 1991b In conjunction with O. B. Nye Jr. Quantitative analysis of paleocommunities in the lower part of the Hamilton Group near Cazenovia, New York. New York State Museum Bulletin 469, p. 37-74.
- 1992a Cupulocrinid crinoids from the Middle Ordovician (Galena Group, Dunleith Formation) of northern Iowa and southern Minnesota. *Journal of Paleontology*, v. 66, p. 99-128.
- 1992b Growth and functional morphology of *Euptychocrinus skopaios*, a dwarf camerate crinoid from the Ordovician. Geological Society of America Abstracts Volume for 1992, v. 24, no. 3, p. 9.

- 1992c In conjunction with W. B. Newman and C. R. Newton. Examples of gradational faunal replacement from the Middle Devonian of New York. Geological Society of America Abstracts Volume for 1992, v. 24, no. 3, p. 66.
- 1992d Ontogeny and functional morphology of *Eoparisocrinus crossmani*, a cladid crinoid from the Middle Ordovician. Paleontological Society Special Publication No. 6, p. 39.
- 1992e In conjunction with W. B. Newman and C. R. Newton. Quantitative paleoecology of Hamilton Group localities in central New York. New York State Geological Association Guidebook for 1992, p. 170-199.
- 1992f In conjunction with D. F. Merriam. A simple method for the comparison of adjacent points on thematic maps. In Use of microcomputers in geology, edited by Hans Kurzl and D. F. Merriam, Plenum Press, p. 227-240.
- 1992g Hybocrinid and disparid crinoids from the Middle Ordovician (Galena Group, Dunleith Formation) of northern Iowa and southern Minnesota. Journal of Paleontology, v. 66, p. 973-993.
- 1993a Paleoecology of a Middle Ordovician Pleurocystitid-Crinoid community from the Midcontinent. Geological Society of America Abstracts Volume for 1993, v. 25, no. 2, p. 7.
- 1993b In conjunction with A. Forster and D. F. Merriam. Relationship of geological and geothermal field properties: Midcontinent Area, USA, an example. Mathematical Geology, v. 25, p. 937-947.
- 1994a Camerate crinoids from the Middle Ordovician (Galena Group, Dunleith Formation) of northern Iowa and southern Minnesota. Journal of Paleontology, v. 68, p. 570-599.
- 1994b Paleoautecology and ontogeny of *Cupulocrinus levorsoni* Kolata, a Middle Ordovician crinoid from the Guttenberg Formation of Wisconsin. In E. Landing (editor), Studies in stratigraphy and paleontology in honor of Donald W. Fisher, New York State Museum Bulletin 481, p. 25-44.
- 1995a Eoparisocrinid crinoids from the Middle Ordovician (Galena Group, Dunleith Formation) of northern Iowa and southern Minnesota. Journal of Paleontology, v. 69, p. 351-366.
- 1995b Allometry in the Pliocene Bivalve *Astarte omalii*: a new look at an old data set. Mathematical Geology, v. 27, p. 399-420.
- 1995c Dendrocrinid crinoids from the Ordovician of northern Iowa and southern Minnesota. Journal of Paleontology, v. 69, p. 939-960.
- 1996a Growth and functional morphology of *Pleurocystites squamosus* Billings, an Ordovician rhombiferan echinoderm. The Paleontological Society Special Publication No. 8, p. 48.
- 1996b Carabocrinid crinoids from the Ordovician of northern Iowa and southern Minnesota. Journal of Paleontology, v. 70, p. 614-631.
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