

FIFTH NORTH AMERICAN PALEONTOLOGICAL CONVENTION

- ABSTRACTS AND PROGRAM -

FIELD MUSEUM OF NATURAL HISTORY
JUNE 28 - JULY 1, 1992

Edited By

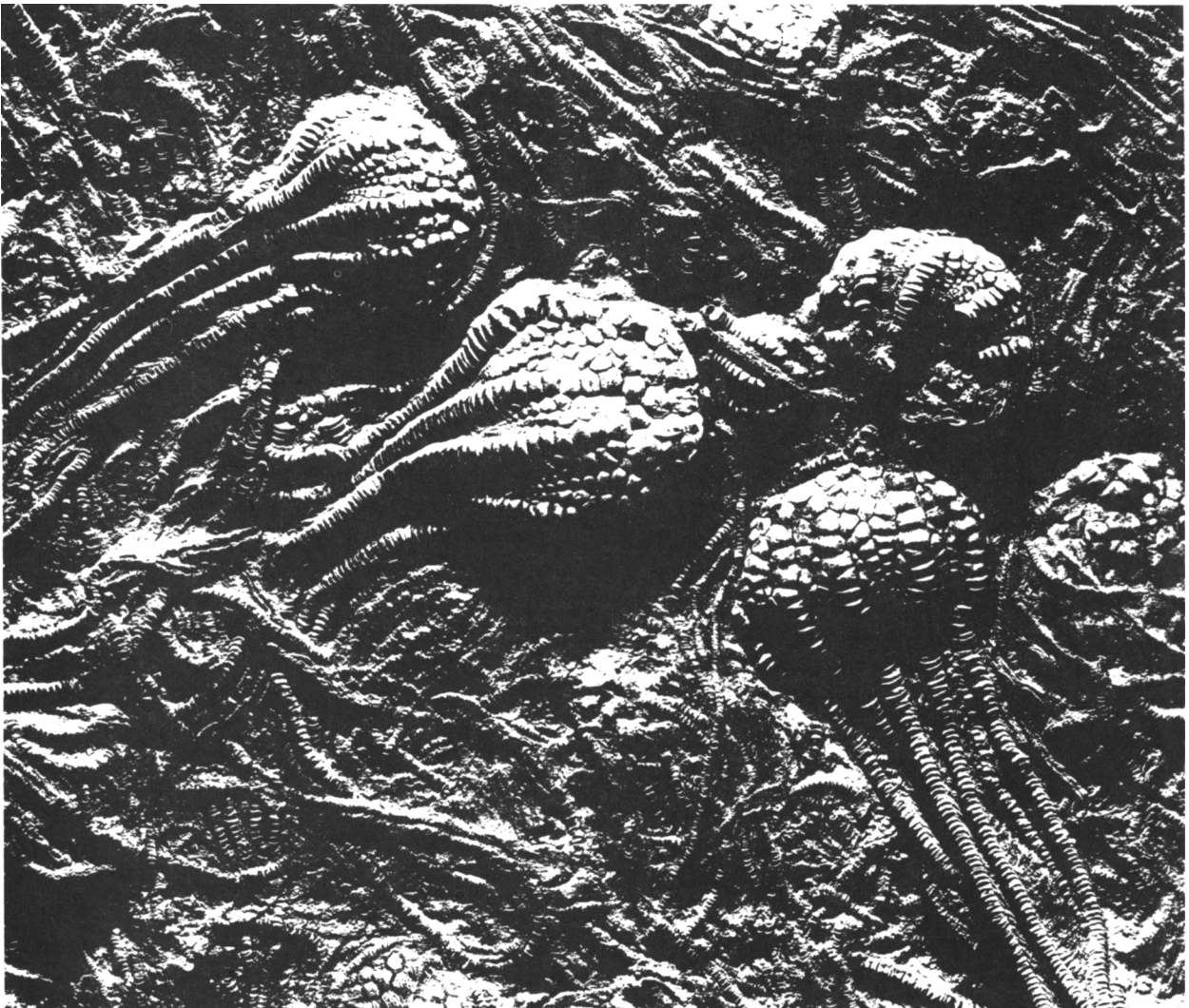
S. Lidgard & P. R. Crane



THE PALEONTOLOGICAL SOCIETY
SPECIAL PUBLICATION NO. 6
1992

Randall S. Spencer
Series Editor

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PREFACE

The First North American Paleontological Convention was held at the Field Museum of Natural History, Chicago, in September 1969 to provide a forum for the exchange of ideas and information among the diverse subdisciplines of paleontology (E.L. Yochelson, Ed., 1970, *Proceedings of the North American Paleontological Convention*, Allen Press, Lawrence, Kansas). Between 700 and 750 paleontologists from all over the world attended this highly successful meeting. Since 1969, three other North American Paleontological Conventions have been organized (Kansas 1977; Montreal 1982; Boulder 1986) and have continued to play an important international role in enhancing communication and encouraging interdisciplinary progress within the broad field of paleontology.

In 1992-1994 the University of Chicago and the Field Museum of Natural History both celebrate their centenaries and as part of these celebrations it seemed appropriate that NAPC should return to Chicago. The paleontologists at the Field Museum, the University of Chicago and the University of Illinois at Chicago are therefore pleased to welcome you to the Fifth North American Paleontological Convention (NAPC.V). The program will begin on the evening of Sunday June 28th and over the next three days (Monday June 29th - Wednesday July 1st) the 329 presentations summarized in this volume will be given as either lectures or posters.

The Chicago meeting is the first North American Paleontological Convention to be held under the formal auspices of the Association of North American Paleontological Societies (ANAPS), which includes representatives from the American Association of Stratigraphic Palynologists, Canadian Association of Palynologists, Cushman Foundation for Foraminiferal Research, North American Micropaleontological Society, Paleobotanical Section of the Botanical Society of America, Paleontological Division of the Geological Society of Canada, Paleontological Research Institution, Society of Vertebrate Paleontology, and the Paleontological Society. The program for NAPC.V has been developed by the Organizing Committee in consultation with ANAPS, with the aims of encouraging interactions between different subdisciplines in paleontology; providing opportunities for the participation of students; and stimulating the integration of paleontological expertise into research within biology and geology in the broad sense.

We are grateful to the other members of the Organizing Committee for all their assistance with many aspects of NAPC.V. In addition, we especially thank all staff of the Department of Geology, Field Museum, and Barbara Ballard, Michael Croon, Mary Dybas, Kathryn Hill, Carol Konieczny and Elaine Zeiger for their invaluable contributions to planning the details of the schedule. We are also indebted to all the symposium organizers for helping us to develop an interdisciplinary program, and the Council of the Paleontological Society, particularly Thomas W. Broadhead, University of Tennessee, and Randall S. Spencer, Old Dominion University, for their cooperation in publishing this abstract volume.

Scott Lidgard
Department of Geology
Field Museum

Peter R. Crane
Department of Geology
Field Museum

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FIELD MUSEUM OF NATURAL HISTORY

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UNIVERSITY OF ILLINOIS AT CHICAGO

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PALEONTOLOGICAL SOCIETIES**

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John J. Flynn, Field Museum of Natural History
Scott Lidgard, Field Museum of Natural History
David Jablonski, The University of Chicago
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Michael C. LaBarbera, The University of Chicago
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Fifth North American Paleontological Convention (NAPC.V)

Field Museum of Natural History, Chicago Summary of Program

Monday, June 29 th , 1991	Tuesday, June 30 th , 1991	Wednesday, July 1 st , 1991	Location
1. <i>The Meaning of Higher Taxa in Macroevolutionary Studies</i> ¹ D. E. Fastovsky & J. M. Clark	6. <i>Early Metazoan Evolution</i> S. Conway Morris	16. <i>Paleobiogeography: Global Change and Evolution</i> R. E. Crick, A. Raymond & C. Scotese	James Simpson Theater
2. <i>Phylogenetics and Rates of Evolution: Morphologic, Genomic and Taxic Rates</i> R. Cloutier & D. K. Elliott	7. <i>Early Metazoan Evolution</i> continued with contributed papers	17. <i>Paleobiogeography: Global Change and Evolution</i> continued with contributed papers	James Simpson Theater
3. <i>Paleontology Applied to Geologic Problem Solving (Part 1)</i> L. E. Edwards & S. R. Jacobson	8. <i>Implications of Sequence Stratigraphy for Evolutionary and Biostratigraphic Patterns</i> R.W. Scott and A.R. Ormiston	18. <i>Environmental and Biological Change in Neogene and Quaternary Tropical America</i> J. B. C. Jackson, A. G. Coates & A. F. Budd	Montgomery Ward Lecture Hall
3. <i>Paleontology Applied to Geologic Problem Solving (Part 2)</i>	9. <i>Long Records of Land Biotas: A Comparison of Wyoming-Montana Paleogene and Siwalik Miocene Sequences</i> A. K. Behrensmeyer & C. E. Badgley, with contributions from T. M. Bown	19. <i>Origination and Extinction</i> contributed papers	Montgomery Ward Lecture Hall
4. <i>Environmental Patterns in the Origins and Fates of Major Groups (Part 1)</i> D. J. Bottjer & D. Jablonski	10. <i>Origin of Modern Terrestrial Ecosystems: Late Mesozoic and Cenozoic</i> G. R. Upchurch & R. K. Stucky	20. <i>Paleozoic and Post-Paleozoic Benthos: Comparative Ecology and Physiology</i> ¹ M. C. Rhodes & G. J. Vermeij	Founders' Room
4. <i>Environmental Patterns in the Origins and Fates of Major Groups (Part 2)</i>	11. <i>Origin of Modern Terrestrial Ecosystems: Late Mesozoic and Cenozoic</i> continued with contributed papers	21. <i>Evolution and Functional Morphology</i> contributed papers	Founders' Room
5. <i>Advances in Deep Sea Paleocology (Part 1)</i> W. C. Miller	12. <i>Conquering Shape and Form: Quantitative Morphometrics</i> ² B. T. Huber & D. Erwin	22. <i>Molecular Paleontology and Exceptional Preservation</i> D. E. G. Briggs	Dining Room E
5. <i>Advances in Deep Sea Paleocology (Part 2)</i>	13. <i>Morphological Evolution</i> contributed papers	23. <i>Taphonomy</i> contributed papers	Dining Room E
	14. <i>Biomolecular and Isotopic Paleontology: An Integrated Approach</i> ⁴ J. D. Hudson, J. M. Hayes & D. M. Martill	24. <i>Late Paleozoic and Early Mesozoic Circum-Pacific Events and their Global Correlation: A Comparison of the Permian and Triassic of the North American and East Asian Pacific Regions</i> ³ M. Dickins, D. W. Boyd & G. D. Stanley	Lecture Hall II
	15. <i>Paleocology</i> contributed papers	25. <i>Lagerstätten</i> H. R. Feldman	Lecture Hall II

¹Sponsored by the Paleontological Society

²Sponsored by the Cushman Foundation for Foraminiferal Research

³Sponsored by International Geological Correlation Project 272

⁴Sponsored by Organic Geochemistry Division of the Geochemical Society of America

NAPC.V Program - Monday, June 29th, 1992

- names indicated are those of the presenter -

	James Simpson Theater	Montgomery Ward Lecture Hall	Founders' Room	Dining Room E
8.00	Welcome			
8.15	Raup			
8.45	Berggren			
9.15	Knoll			
9.45	Patterson			
10.15	Break			
10.30	1 Intro - Higher Taxa in Macroevolution	3 Intro - Applied Paleontology	4 Intro - Environmental Patterns	5 Intro - Deep Sea Paleoecology
10.35	1 Rieppel	3 Jacobson	4 Jablonski	5 Miller
10.55	1 Damuth	3 Soja	4 Hunt	5 Smith
11.15	1 Stein	3 Finney	4 Fortey	5 Crimes
11.35	1 Fastovsky	3 Palmer	4 Miller	5 Pflugger
11.55	1 Bambach	3 Baird	4 Patzkowsky	5 Ekdale
12.15	1 Janis	3 Kontrovitz	4 Westrop	5 Fu
12.35	1 DHondt			
12.55	1 Carlson			
1.15	LUNCH			
1.55	2 Intro - Rates of Evolution	3 Applied Paleontology - contd.	4 Environmental Patterns - contd.	5 Deep Sea Paleoecology - contd.
2.00	2 Cracraft	3 Dorning	4 Droser	5 Gooday
2.20	2 Cloutier	3 Gyllenhaal	4 Hickey	5 Levin
2.40	2 Smith	3 Sageman	4 Benton	5 Lutz
3.00	2 Huelsenbeck	3 Khan	4 Lidgard	5 Voight
3.20	2 Flynn	3 Verteuil	4 Parsons	5 Callender
3.40	2 Hauser	3 Edwards	4 Sepkoski	
4.00	2 Wilkinson			
4.20	3 Lane			
5.00	Roundtable Discussion - Paleontology on Public Lands			Poster Session - Hall 38
6.00				
7.00				

NAPC.V Program - Tuesday June 30th, 1992

- names indicated are those of the presenter -

	James Simpson Theater	Montgomery Ward Lecture Hall	Founders' Room	Dining Room E	Lecture Hall II
8.15	6 Intro - Early Metazoan Evolution	8 Intro - Implications of Sequence Stratigraphy	10 Intro - Modern Terrestrial Ecosystems	12 Intro - Shape and Form: Morphometrics	14 Intro - Biomolecular & Isotopic Paleontology
8.20	6 Fisher	8 Armentrout	10 Upchurch	12 Arnold	14 Hudson
8.40	6 Kauffman	8 Scott	10 Crepet	12 Huber	14 Anderson
9.00	6 Butterfield	8 Kidwell	10 Crane	12 Wei	14 Popp
9.20	6 Runnegar	8 Holland	10 Weishampel	12 Lohmann	14 Kenig
9.40	6 Narbonne	8 McGhee	10 Labandeira	12 Lazarus	14 Belin
10.00	6 Conway Morris	8 Ormiston	10 Greenwood	12 Budd	14 Martill
10.20	6 Bengtson	8 Brett	10 Stucky	12 Key	14 Westbrook
10.40	6 Wood	8 Holterhoff	10 Prothero	12 Hageman	14 Van Bergen
11.00	6 Foote	8 Bergen	10 Jacobs	12 Erwin	14 Taylor
11.20	6 Peel	8 Leckie	10 Graham	12 Crampton	14 Showers
11.40	6 Budd	8 Kauffman	10 Crowley	12 Macleod	14 Barrick
12.00	6 Collins	8 Shaffer	10 Olson	12 Stevens	14 Kolodny
12.20	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1.30	7 Early Metazoan Evolution - contd.	9 Intro - Long Records of Land Biotas	11 - Modern Terrestrial Ecosystems - contd.	13 Morph. Evolution contributed papers	15 Paleocology contributed papers
1.45	7 Nedin	9 Cerling	11 Taggart	13 Thomas	15 Anderson
2.00	7 Valentine	9 Koch	11 Lucas	13 Landman	15 Hubbard
2.15	7 Jacobs	9 Wing	11 Sereno	13 Boyajian	15 Burke
2.30	7 Signor	9 Willis	11 Forster	13 Zaslavskaya	15 Skelton
2.45	7 Rudkin	9 Bown	11 Holtz	13 Carter	15 Villamil
3.00	7 Yochelson	9 Behrensmeyer	11 Pike	13 Mitchell	15 Harper
3.15	7 Hart	9 Bartels	11 Romero	13 Heaney	15 Rindsberg
3.30	7 Li	9 Maas	11 Herendeen	13 Schneider	15 Zell
3.45	7 Van Iten	9 Barry	11 Masterson	13 Nehm	15 Johns
4.00	7 Sumrall	9 Gingerich	11 Melchior	13 Rice	15 Meyer
4.15	7 Rowland	9 Flynn	11 Wyss	13 Staley	15 Miller
4.30		9 Gunnell	11 Nakaya	13 MacKinnon	15 Fields
4.45		9 Morgan	11 Watabe	13 Sumida	15 Beerbower
5.00		9 Badgley		13 Gaudin	15 Bocherens
5.15					
6.00	Horner Plenary - Public Lecture				
7.00	STANLEY FIELD HALL		COCKTAIL RECEPTION & DINNER		STANLEY FIELD HALL
10.00					

Program - Wednesday July 1st, 1992

- names indicated are those of the presenter -

	James Simpson Theater	Montgomery Ward Lecture Hall	Founders' Room	Dining Room E	Lecture Hall II
8.15	16 Intro - Paleobiogeography	18 Intro - Tropical America	20 Intro - Paleozoic & Post-Paleozoic Benthos	22 Intro - Molecular Paleontology	24 Intro - Circum-Pacific Events
8.20	16 Hughes	18 Coates	20 Thayer	22 Marshall	24 Dickins
8.40	16 Jin	18 Dowsett	20 Baumiller	22 Polson	24 Renner
9.00	16 Crick	18 Cronin	20 Fordyce	22 Walton	24 Hanger
9.20	16 Crame	18 Geary	20 Rhodes	22 Clegg	24 McRoberts
9.40	16 Klapper	18 Collins	20 Alexander	22 Stathopolos	24 Campbell
10.00	16 Young	18 Johnson	20 Morris	22 Johnson	24 Kamada
10.20	16 House	18 Cheetham	20 Miller	22 Briggs	24 Stanley
10.40	16 Kelley	18 Jackson	20 McKinney	22 Yang	
11.00	16 Raymond	18 Allmon	20 Aronson	22 Logan	
11.20	16 Belasky	18 Collins	20 Vermeij	22 CoBabe	
11.40	16 Ziegler	18 Webb		22 Hemsley	
12.00	16 Rowley	18 Colinvaux		22 Wilby	
12.20					
	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
12.45	Gould Plenary Lecture				
1.15					
	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1.55	Paleobiogeography - contd.	19 Originat.-Extinction contributed papers	21 Ev.-Funct. Morph. contributed papers	23 Taphonomy contributed papers	25 Intro - Lagerstätten
2.00	17 Maples	19 Guensberg	21 Cohen	23 Brandt	25 Feldman
2.15	17 Yao	19 Elias	21 Brower	23 Terry	25 Kluessendorf
2.30	17 Bhalla	19 Lenz	21 Donovan	23 Oji	25 Lo Duca
2.45	17 Russell	19 Hirsch	21 Zhang	23 Nebelsick	25 Schultze
3.00	17 Johnson	19 Hunt	21 Titus	23 Mapes	
3.15	17 Young	19 Schubert	21 Goldman	23 Davies	
3.30	17 Markwick	19 Roy	21 Johnston	23 Miller	
3.45	17 Keller	19 Norris	21 Young	23 Parsons	
4.00	17 Fredericksen	19 Harries	21 Purnell	23 Powell	
4.15	17 Flessa	19 Clemens	21 Kenawy	23 Walker	
4.30		19 Aubry	21 Mapes	23 Shroba	
4.45		19 Alroy	21 Abler	23 Martin	
5.00		19 Moss	21 Nicholls	23 Davis	
5.15		19 Lieberman	21 Whittle	23 Rogers	
5.30					

FIFTH NORTH AMERICAN PALEONTOLOGICAL CONVENTION

* * PROGRAM * *

———— SUNDAY JUNE 28 ————

12:00p REGISTRATION BEGINS
West Lobby

12:00p PALEONTOLOGY EXHIBIT

-5:00p *Courtesy of the Mid-America
Paleontological Society*
North Lounge

5:30p OPENING RECEPTION and
-8:00p REGISTRATION
Stanley Field Hall

———— MONDAY JUNE 29 ————

8:00a WELCOME
Willard L. Boyd
President, Field Museum
Simpson Theater

OPENING PLENARY LECTURES

Simpson Theater

S. Lidgard and P.R. Crane, Presiding

- 8:15a Raup, D.M., Large body impact: the least unlikely cause of pulsed extinction 240
- 8:45a Berggren, W.A., Time and time again: getting it right 27
- 9:15a Knoll, A.H., The advent of the Phanerozoic world: Vendian stratigraphy, environmental change, and evolution 169
- 9:45a Patterson, C., The meaning of fossils, 1992 231

1. THE MEANING OF HIGHER TAXA IN MACROEVOLUTIONARY STUDIES

Simpson Theater

D.E. Fastovsky and J.M. Clark, Presiding

- 10:30a Introduction
- 10:35a Rieppel, O., What is the significance of the supraspecific taxa in macroevolutionary studies? 246

- 10:55a Damuth, J., The uses and irrelevance of higher taxa 80
- 11:15a Stein, W.E., Evolution and development in the origin of major groups of vascular plants 280
- 11:35a Fastovsky*, D.E. & Sheehan, P.M., Higher taxa in the fossil record and the recognition of evolutionary events: patterns vs. processes 94
- 11:55a Bambach*, R.K. & Sepkoski, J.J., Historical evolutionary information in the traditional Linnean hierarchy . . 16
- 12:15p Janis, C., The importance of paraphyletic groups in mammalian paleobiology 148
- 12:35p D'Hondt, S., The definition and macroevolutionary study of planktic foraminiferal higher taxa 133
- 12:55p Carlson, S.J., Inarticulata, Brachiopoda, Lophophorata: what do they signify? 51

2. PHYLOGENETICS AND RATES OF EVOLUTION: MORPHOLOGIC, GENOMIC, AND TAXIC RATES

Simpson Theater

R. Cloutier and D.K. Elliott, Presiding

- 1:55p Introduction
- 2:00p Cracraft, J., Problems with measuring taxic, morphological, and molecular rates of evolution: a methodological overview 70
- 2:20p Cloutier*, R. & Rowe, T., Cladistics and rates of morphological evolution: computation and comparison 61
- 2:40p Smith*, A.B. & Christen, R., Morphological and molecular rates of evolution in post-Paleozoic echinoids 273
- 3:00p Huelsenbeck*, J.P., & Hillis, D.M., Rates of evolution and fossils in phylogenetic analysis: a computer simulation approach 140

3:20p	Flynn, J.J., Rates of evolution in the Carnivora (Mammalia): the importance of phylogeny and fossils	100	2:20p	Gyllenhaal, E.D., Reconciling the lithologic and paleobotanic records of climatic change during the Pennsylvanian	116
3:40p	Hauser*, D.L., Boyajian, G.E. & Shubin, N.H., Rates of evolution and homoplasy	124	2:40p	Sageman*, B.B. & Kauffman, E.G., Benthic community analysis and the prediction of organic carbon content in Mesozoic black shale facies	258
4:00p	Wilkinson*, M. & Benton, M.J., Cladistics and the rate of homoplastic morphological evolution	314	3:00p	Brush, G.S. & Khan*, H., Paleontological methods and environmental science	40
3. PALEONTOLOGY APPLIED TO GEOLOGIC PROBLEM SOLVING Montgomery Ward Lecture Hall <i>L.E. Edwards and S.R. Jacobson, Presiding</i>			3:20p Versteuil*, L. de & Norris, G., A new dinoflagellate cyst sequence biostratigraphic framework for the Miocene of the Baltimore Canyon Trough and adjacent Salisbury Embayment		
10:30a	Introduction		3:40p	Edwards*, L.E. & Clarke, J.S., Biostratigraphic investigations help evaluation of the ground-water-flow system near the Savannah River Site, Georgia and South Carolina	90
10:35a	Jacobson*, S.R. & Askin, R.A., Organic stratigraphy and its applications with examples from the North American Western Interior and Antarctica	147	4:00p	Lane*, H.R., Frye, M.W. & Couples, G.D., Biothems: sequence stratigraphic units and their implications for regional tectono-stratigraphic interpretations	176
10:55a	Soja, C.M., Using fossils to identify allochthonous oceanic islands in the ancient geologic record	275	4. ENVIRONMENTAL PATTERNS IN THE ORIGINS AND FATES OF MAJOR GROUPS Founders' Room <i>D.J. Bottjer and D. Jablonski, Presiding</i>		
11:15a	Finney*, S.C. & Ethington, R.L., Graptolite and conodont faunas in Ordovician Vinini Formation, Roberts Mountains, central Nevada, demonstrate that the Roberts Mountains allochthon is not an exotic terrane	97	10:30a	Introduction	
11:35a	Repetski, J.E., Taylor, M.E., Collins, D.S., Palmer*, A.R. & Wood, G.D., Cambrian and Ordovician paleontological studies in the Reelfoot Basin, southern midcontinent, U.S.A.	243	10:35a	Jablonski, D., Nothing new under the sun? Tropical vs. temperate patterns in the biogeography of evolutionary innovation	143
11:55a	Baird*, G.C., Lyons, T.W. & Brett, C.E., Thermally-controlled color gradient for fossils and associated sediments: implications for paleoecology	14	10:55a	Crimes, T.P. & Hunt*, N.C., Onshore-offshore patterns in Late PreCambrian and Lower Palaeozoic trace fossils	77
12:15p	Kontrovitz*, M., Slack, J.M., Ainsworth, N.R. & Burnett, R.D., Color in ostracode shells: taphonomy and paleotemperature interpretation	172	11:15a	Fortey*, R.A. & Owen, R.M., Phylogenetic history of major trilobite clades in relation to paleoenvironment	104
2:00p	Dorning, K.J., The interpretation of Ordovician, Silurian, and Devonian paleoenvironments utilizing the distribution of acritarch associations and organic palynofacies	87	11:35a	Miller, A.I., Onshore-offshore patterns during the Ordovician radiations: a worldwide assessment	210

11:55a	Patzkowsky, M.E., Environmental patterns in the Ordovician radiation of articulate brachiopods: comparison between North America and the Welsh Basin	232	11:35a	Seilacher, A. & Pfluger*, F., Trace fossils from the Late Proterozoic of North Carolina: early conquest of deep-sea bottoms	265
12:15p	Westrop*, S.R., Tremblay, J.V. & Landing, E., Declining importance of trilobites in Ordovician nearshore communities: displacement or dilution? .	310	11:55a	Ekdale, A.A., Paleoecologic aspects of ichnofabrics (biogenic sedimentary fabrics) in deep-sea sediment	91
2:00p	Droser*, M.L., Hampt, G. & Clements, S., Environmental patterns in the origin and diversification of deep-water scleractinian and rugose corals	89	12:15p	Fu*, S. & Werner, F., Bioturbational structures in the North Atlantic: new approaches for studying cores	106
2:20p	Hickey*, L.J. & Taylor, D.W., Paleobiology of early angiosperms: evidence from sedimentological associations in the Early Cretaceous Potomac Group of the eastern U.S.A. .	128	2:00p	Gooday, A.J., Some recent advances in the study of deep-sea foraminiferal biology and their palaeoecological significance	111
2:40p	Benton*, M.J. & Storrs, G.W., Replacement events among tetrapods: expansion or competition?	25	2:20p	Levin, L.A., The ecology of xenophyophores, an enigmatic group of agglutinating rhizopods	182
3:00p	Lidgard*, S., Taylor, P.D. & Jablonski, D., Comparative ecology of bryozoan radiations: origin of novelties in cyclostomes and cheilostomes	184	2:40p	Lutz*, R.A. & Haymon, R.M., Fossil clues to paleoecology of deep-sea hydrothermal vent fauna: summary of recent findings	190
3:20p	Parsons, P.A., From environmental fluctuations and energy availability to evolutionary change and speciation . . .	230	3:00p	Walker, S.E. & Voight*, J.R., Epibiosis, symbiosis and gastropod taphonomy in the deep sea	303
3:40p	Sepkoski*, J.J. Jr. & Miller, A.I., Patterns of diversity on the Paleozoic shelf: implications for controls on clade history	266	3:20p	Callender*, W.R. & Powell, E.N., Time averaging and temporal persistence in chemoautotrophic molluscan-dominated death assemblages on the Louisiana continental slope	49

4:00p POSTER SESSION
-6:00p Hall 38

5. ADVANCES IN DEEP SEA PALEOECOLOGY

Dining Room E
W.C. Miller, Presiding

10:30a	Introduction		Bales, G.S., Thin-plate spline analysis of shape differences between a primitive and modern rhinoceros . . .	15
10:35a	Miller, W., III, Advances in deep-sea paleoecology: introduction to the symposium	214	Brand*, L.R. & Kramer, J., Underprints of vertebrate and invertebrate trackways in the Coconino Sandstone (Permian) in northern Arizona	33
10:55a	Smith, C.R., Tempo and mode in deep-sea benthic ecology: punctuated equilibrium revisited	274	Broadhead*, T.W. & Driese, S.G., Experimental and natural abrasion of conodonts in marine and eolian environments	38
11:15a	Crimes, T., Evolution, dispersal and habitat preference of deep-sea trace fossils	76	Bryan, J.R., Oligocene carbonate platform evolution and reef development in the eastern Gulf Coastal Plain	41

- Burns, T.P., Evolution of interactive niche breadth and its consequences in paleoecosystem networks 46
- Cadee, G.C., Shell-crushing by two duck species, *Tadoma tadoma* and *Somateria mollissima*, in the Wadden Sea. Paleoecologic implications 48
- Carrillo, M., Benthonic foraminifera of the northern Monagas area, in the eastern Venezuelan basin: its implications in hydrocarbon exploration 52
- Cione*, A.L. & Tonni, E.P., A new stage in the Upper Cenozoic of southern South America 56
- Ciurca, S.J. Jr., New occurrences of Silurian eurypterids (Carcinosomatidae) in Pennsylvania, Ohio and New York 57
- Clark*, G.R. II & Archer, A.W., Pliocene scallop growth lines: potential for environmental reconstruction and population dynamics 58
- Dent*, S.R. & Uhen, M., Biostratigraphy of Recent intertidal bivalves at False Bay, San Juan Island, Washington, U.S.A. .. 83
- Dewing*, K. & Caldwell, W.G.E., Biostratigraphy of Late Ordovician-Early Silurian strophomenoid brachiopods from Anticosti Island, Quebec 84
- Hagadorn*, J.W. & Boyajian, G.E., Changes in predatory behavior and efficiency: gastropod drilling patterns in Miocene-Pliocene *Turritella* (Gastropoda) 117
- Hartman, J.H., Biochronology of uppermost Cretaceous and Lower Tertiary nonmarine Mollusca of the northern Great Plains, U.S.A., and Canada 123
- Horowitz*, A.S. & Pachut, J.F., Devonian bryozoan extinction and diversification . 136
- Kaasa, M.E. Jr., Late Pennsylvanian and Permian *Turrilepadida* (Machaeridia) from the western and south-central United States 154
- Kammer*, T.W. & Ausich, W.I., Demise of the middle Paleozoic crinoid fauna: gradual or mass extinction? 156
- Kloc, G.J., Spine function in the odontopleurid trilobites *Leonaspis* and *Dicranurus* from the Devonian of Oklahoma 167
- Krumm, D.K., Comparison of Cretaceous and Oligocene endolithic reef communities from Puerto Rico 173
- Lask, P.B., Paleocology of *Cyclocrinites darwini* (Miller) - a cyclocrinid alga from the Cincinnati series (Upper Ordovician) 177
- Lescinsky, H., Epibionts on *Chlamys hastata* and *Chlamys rubida*: taphonomic and paleoecologic implications 181
- McShea, D.W., Functional vs. phylogenetic control in the evolution of the vertebral column 208
- Olson*, W. & Dewey, C., Ostracode paleoecology of the Bangor-Pennington transition (Chesterian, Mississippian) in northeastern Alabama 226
- Ott, C., Morphology and movement of the presacral vertebral column in *Phenacodus vortmani* and *Phenacodus primaevus* 228
- Plotnick*, R.E., Gardner, R.H., Burns, T.P. & O'Neill, R.V., Neutral models for the spatial distribution of organisms: implications for paleoenvironmental interpretation 235
- Polson*, E.S., Lawrence, J. & Robbins, L.L., Shell matrix proteins--a potential tool for investigating the phylogenetic relationships of the Echinodermata 236
- Robbins*, L.L. & Yates, K., Role of microorganisms in the production of lime mud and implications for interpretation of ancient micrite deposits 248
- Roopnarine, P.D., A Late Neogene morphological trend in a venerid bivalve, *Chione cancellata*, from the Florida peninsula 251
- Rothschild, B., Intertwining of paleontology and medicine: implications for structure-function relationships, behavior, and habitat in paleontology 252
- Sandy, M.R., Paleobiogeography of Mesozoic articulate brachiopods from the Western Cordillera of North America and their potential for paleogeographic studies 259

Scotese, C.R., Phanerozoic paleogeographic, plate tectonic and paleoclimatic reconstructions	263	9:20a Runnegar, B., Paleobiology of the Ediacara Fauna	256
Starratt, S.W., The role of environment in the diversity and evolutionary turnover rates of the Foraminiferida	278	9:40a Narbonne*, G.M. & Dalrymple, R.W., Taphonomy and ecology of deep-water Ediacaran organisms from northwestern Canada	219
Taylor*, P.D. & Todd, J.A., Bioimmuration: exceptional fossil preservation made routine	287	10:00a Conway Morris, S., Ediacaran survivors	69
Tetreault, D.K., Paleoecologic implications of epibionts on the Silurian lichid trilobite <i>Arctinurus</i>	289	10:20a Yue, Z., Bengtson*, S. & Grant, S.W.F., Biology and functional morphology of <i>Cloudina</i> , the earliest known metazoan with a mineralized skeleton	325
Tiwari, R.P., Nuculid bivalves from Surma Group, Mizoram, India	293	10:40a Wood, R., Evolution of early reef-ecosystems	317
Tollerton, V.P. Jr., Preliminary study of the shape of eurypterid prosomas using Fourier analysis	294	11:00a Foote, M., Early morphological diversity in blastozoan echinoderms	102
Wagner, P.J. III, Phylogenetics of the Early Paleozoic Archaeogastropoda	300	11:20a Peel*, J.S., Conway Morris, S. & Ineson, J.R., The Sirius Passet Fauna, an Early Cambrian Lagerstätte from North Greenland	233
Wahlman*, G.P., Tasker, D.R., St. John, J.W. & Werle, K.J., Early Permian (Middle-Late Wolfcampian) phylloid algal/Tubiphytes bioherms and associated facies along the margin of the Orogande Basin, Hueco Mountains, west Texas	301	11:40a Budd, G.E., Arthropods from North Greenland: exceptional data in the Cambrian explosion debate	44
Whitehead, P.F., Anatomy of the forelimb in <i>Theropithecus oswaldi</i>	311	12:00p Collins, D., Whither <i>Anomalocaris</i> ? The search in the Burgess Shale continues	66

5:00p ROUND TABLE DISCUSSION:
-7:00p PALEONTOLOGY ON PUBLIC LANDS
Montgomery Ward Lecture Hall
V.L. Santucci, Presiding

———— TUESDAY JUNE 30 ————

6. EARLY METAZOAN EVOLUTION

Simpson Theater

S. Conway Morris, Presiding

8:15a Introduction	
8:20a Fisher, D.C., Spiral waves in excitable media: a model for diverse aspects of organismal development	98
8:40a Kauffman, S.A., Cambrian explosion and Permian quiescence: implications of rugged fitness landscapes	160
9:00a Butterfield, N.J., Pre-Ediacaran multicellular life: harbinger of a Phanerozoic radiation	47

7. EARLY METAZOAN EVOLUTION,

continued with contributed papers

Simpson Theater

S.M. Rowland and P.W. Signor, Presiding

1:45p Nedin, C., Palaeontology and palaeoecology of the Lower Cambrian Emu Bay Shale Lagerstätten, Kangaroo Island, South Australia	221
2:00p Valentine, J.W., Early metazoan evolution and the concept of progress	296
2:15p Jacobs, D.K., Two applications of developmental genetics to paleontology: segmentation genes in molluscs and preoral appendages in taxa of uncertain affinity	145
2:30p Signor, P.W., Taxonomic diversity and faunal turnover in the Early Cambrian: Did the most severe mass extinction of the Phanerozoic occur in the Botomian stage?	272

2:45p	Rudkin, D.M., A possible archaeopriapulid trace fossil from the Middle Cambrian Stephen Formation, British Columbia	255
3:00p	Yochelson*, E.L., Parrish, M. & Fedonkin, M.A., Reconstruction of the enigmatic Late Cambrian Climactichnites	321
3:15p	Hart, S.F., Archaeocyath palaeoecology	122
3:30p	Li*, X. & Droser, M., The development of Early Paleozoic shell concentrations: evidence from the Cambrian and Ordovician of the Great Basin	183
3:45p	Van Iten, H., Affinities and class-level systematics of the phylum Cnidaria	297
4:00p	Sumrall*, C.D. & Sprinkle, J., Could edrioasteroids move?	284
4:15p	McMenamin, M.A.S., Rowland*, S.M., Corsetti, F., Dix, A.M. & Nance, R.P., Vendian body fossils (?) and isotope stratigraphy from the Caborca area, Sonora, Mexico	206

8. IMPLICATIONS OF SEQUENCE STRATIGRAPHY FOR EVOLUTIONARY AND BIOSTRATIGRAPHIC PATTERNS
 Montgomery Ward Lecture Hall
R.W. Scott and A.R. Ormiston, Presiding

8:15a	Introduction	
8:20a	Armentrout, J.M., Biostratigraphic signature of sequence boundaries, maximum flooding surfaces, condensed sections, and depositional systems tracts	9
8:40a	Scott, R.W., Are seismic/depositional sequences chronostratigraphic units?	264
9:00a	Kidwell, S.M., Internal anatomy and skeletal taphonomy of marine sequences: variation with subsidence	165
9:20a	Holland, S.M., True and apparent paleontologic patterns produced by stratigraphic sequences	130
9:40a	McGhee, G.R., Biological and evolutionary responses to transgressive-regressive cycles	204
10:00a	Ormiston*, A.R. & Klapper, G., Paleoclimate, controls on Upper Devonian source rock sequences and stacked extinctions	227

10:20a	Brett*, C.E., & Baird, G.C., Taphofacies and bioevents in marine sequences of the Appalachian Basin Middle Devonian	35
10:40a	Holterhoff, P.F., Ecophenotypic variation and phylogeny within the Erisocrinaceae (Crinoidea): linkage of morphology, ecology, and sea-level in the Late Paleozoic	131
11:00a	Bergen, J., Assemblage turnovers in Mesozoic calcareous nannofossils: periodicity and distinction from the terminal Cretaceous event	26
11:20a	Leckie*, R.M., Scott, R.W., Bralower, T.J. & Sliter, W.V., Relationship between sequence boundaries and the evolutionary history of planktonic foraminifera, calcareous nannofossils, and reef communities in the mid-Cretaceous (Barremian-Cenomanian)	179
11:40a	Kauffman*, E.G. & Sageman, B.B., Biological patterns in sequence stratigraphy; Cretaceous of the Western Interior Basin, North America	158
12:00p	Shaffer*, B.L., Pacht, J.A. & Bowen, B.E., Aspects of Gulf Coast late Neogene sequence stratigraphy	268

9. LONG RECORDS OF LAND BIOTAS: A COMPARISON OF WYOMING-MONTANA PALEOGENE AND SIWALIK MIOCENE SEQUENCES
 Montgomery Ward Lecture Hall
A.K. Behrensmeyer and C.E. Badgley, Presiding

1:40p	Introduction	
1:45p	Cerling*, T.E. & Quade, J., Isotopic evidence for climatic, ecologic, and faunal change in the Siwaliks of Pakistan	54
2:00p	Koch*, P.L., Dettman, D.L. & Zachos, J.C., Isotopic evidence for paleoclimatic and paleoatmospheric variations from the Paleogene Bighorn Basin sequence	170
2:15p	Wing*, S.L. & Hickey, L.J., Paleocene-Eocene floral and climatic change in the Bighorn Basin	316

2:30p	Willis*, B.J., Behrensmeyer, A.K., Bown, T.M., Kraus, M.J., Bridge, J.S. & Khan, I., Controls on fluvial systems in the Siwalik Neogene and Wyoming Paleogene	315	4:45p	Morgan*, M.E., Kappelman, J., Badgley, C., Gunnell, G.F., Gingerich, P.D., Maas, M. & Legendre, S., Comparative paleoecology of Paleogene and Neogene mammalian faunas: body-size structure	216
2:45p	Bown*, T.M., Kraus, M.J. & Aslan, A., Floodplains and paleosols in the Wyoming Eocene sequence: implications for the taphonomy and paleoecology of faunas	31	5:00p	Badgley*, C., Behrensmeyer, A.K., Bartels, W.S. & Bown, T.M., Preservational, paleoecological, and evolutionary patterns in the Wyoming-Montana Paleogene and Siwalik Neogene records	13
3:00p	Behrensmeyer*, A.K., Quade, J. & Willis, B., Floodplains and paleosols in the Siwalik Miocene sequence: implications for taphonomy and paleoecology of faunas	22	10. ORIGIN OF MODERN TERRESTRIAL ECOSYSTEMS: LATE MESOZOIC AND CENOZOIC Founders' Room <i>G.R. Upchurch and R.K. Stucky, Presiding</i>		
3:15p	Bartels*, W.S., Bown, T.M., Badgley, C., Behrensmeyer, A.K., Morgan, M. & Raza, S.M., Taphonomy of Paleogene and Neogene vertebrate assemblages	19	8:15a	Introduction	
3:30p	Maas*, M.C., Gingerich, P.D., Gunnell, G. & Krause, D.W., Patterns of faunal turnover and diversity in the Wyoming-Montana Paleogene in relation to regional and global events . .	191	8:20a	Upchurch, G.R., Cretaceous vegetational change: a biomal perspective	295
3:45p	Barry*, J.C., Morgan, M.E., Flynn, L.J., Jacobs, L.L. & Lindsay, E.H., Patterns of faunal turnover and diversity in the Siwalik Neogene record in relation to regional and global events	18	8:40a	Crepet*, W.L., Nixon, K.C. & Brenner, G.J., Mid to Late Cretaceous diversity of angiosperm floral structure and implications for the history of pollination mechanisms	74
4:00p	Gingerich*, P.D. & Gunnell, G.F., Mammalian lineages in the Paleogene of Wyoming-Montana; rates of change, species longevities and modes of speciation	109	9:00a	Crane*, P.R. & Lidgard, S., The Cretaceous vegetational history of the tropics	73
4:15p	Flynn*, L.J., Barry, J.C., Morgan, M.E., Pilbeam, D., Jacobs, L.L., & Lindsay, E.H., Neogene Siwalik mammalian lineages: species longevities, rates of change and modes of speciation	101	9:20a	Weishampel, D.B., The evolution of ornithischian dinosaurs during the Cretaceous: jaws, plants, and evolutionary metrics revisited	308
4:30p	Gunnell*, G.F., Gingerich, P.D., Morgan, M.E. & Maas, M., Comparative paleoecology of Paleogene and Neogene mammalian faunas: guild structure and diversity . . .	115	9:40a	Labandeira, C.C., Diversity, diets, and disparity: determining the effect of the terminal Cretaceous extinction on insect evolution	174
			10:00a	Greenwood*, D.R. & Collinson, M.E., The origins and Paleogene history of modern plant communities	113
			10:20a	Stucky, R.K., Paleogene community change among terrestrial vertebrates of the Western Hemisphere	282
			10:40a	Prothero, D.R., Evolutionary patterns at the terrestrial Eocene-Oligocene boundary in North America	238

11:00a	Jacobs*, L. & Janis, C., Patterns of evolution in North American Neogene mammals	146
11:20a	Graham, R.W., Response of North American mammal communities to late Quaternary environmental fluctuations	112
11:40a	Crowley, T.J., Potential effect of climate change on terrestrial biota	79
12:00p	Olson*, J.S. & Upchurch, G.R. Jr., Patterns of terrestrial plant carbon: late Mesozoic and Cenozoic	225

11. ORIGINS OF MODERN TERRESTRIAL ECOSYSTEMS: LATE MESOZOIC AND CENOZOIC,

continued with contributed papers
Founders' Room

G.R. Upchurch and R.E. Taggart, Presiding

1:45p	Taggart*, R.E. & Cross, A.T., Mid-Miocene post-disturbance vegetation dynamics and the emergence of cold desert/steppe vegetation in the northern intermountain region	285
2:00p	Lucas*, S.G. & Hunt, A.P., The origin of mammals: chronology and paleobiogeography	189
2:15p	Sereno, P.C., Origin and early evolution of Aves: dinosaurs, ancient birds, and mtDNA sequences	267
2:30p	Martinez, R.N., Forster*, C.A. & May, C.L., Two new carnivorous cynodonts from the Ischigualasto Formation (Upper Triassic) of Argentina	202
2:45p	Holtz, T.R. Jr., Endemicity analysis of global Cretaceous dinosaurian faunas	132
3:00p	Pike, E.M., Upper Cretaceous amber arthropods and their implications on changes in insect community structure	234
3:15p	Romero*, E.J. & Palma, R., Early angiosperm fossil leaves in Chubut Group, Cretaceous, Argentina	250
3:30p	Herendeen*, P.S. & Crepet, W.L., Paleobotanical and biogeographic history of the legumes (Leguminosae), an important component in Cenozoic and modern tropical terrestrial ecosystems	127
3:45p	Masterson, J., The geological history of polyploidy in woody angiosperms	203

4:00p	Melchior, R., Paleobotany of the Paleocene St. Stephens site, Berkeley County, South Carolina	209
4:15p	Wyss*, A.R., Flynn, J.J., Swisher, C.C. III, Charrier, R. & Norell, M.A., Fossil mammals from the central Chilean Andes: a new interval in the South American land mammal succession, and implications for Eocene-Oligocene boundary events and Andean tectonics	318
4:30p	Nakaya, H., Faunal turnover of the Miocene mammalian faunas of Sub-Saharan Africa and the middle Miocene paleoenvironmental change	218
4:45p	Watabe, M., Eurasian and North American phylogeny of Turolian hipparionine horses (<i>Perissodactyla</i> , <i>Mammalia</i>) in China	305

12. CONQUERING SHAPE AND FORM: QUANTITATIVE MORPHOMETRICS

Dining Room E

B.T. Huber and D. Erwin, Presiding

8:15a	Introduction	
8:20a	Arnold*, A.J., Kelly, D.C. & Parker, W.C., Macro- and microevolutionary aspects of the early Paleogene recovery of the planktonic foraminifera	10
8:40a	Bijma, J., Huber*, B.T. & Hemleben, C., A fixed axis coiling model for the living planktonic foraminifer <i>Globigerinella siphonifera</i>	29
9:00a	Wei, K.-Y., Towards a pattern recognition approach for stratophenetics	307
9:20a	Lohmann, G.P., Accelerated development in planktonic foraminifera: adaptive response to reduced ocean mixing	188
9:40a	Lazarus, D., Morphometric studies of radiolarian evolution	178
10:00a	Budd*, A.F. & Johnson, K.G., Morphometric species recognition and phylogeny reconstruction in scleractinian reef corals	42
10:20a	Key*, M.M. Jr., Macroevolutionary patterns in bryozoans	164

10:40a	Hageman, S.J., Ecophenotypic and geographic constraints in a microevolutionary study of a rhabdomesid bryozoan	118	3:30p	Schneider, J.A., Fusion of radial ribs in Cardiidae (Bivalvia: Veneroidea): implications for phylogenetic reconstruction and the study of iterative homology	260
11:00a	Erwin, D.H., Morphometric and phylogenetic analyses of the Paleozoic Subulitoidea (Gastropoda) . .	93	3:45p	Nehm*, R.H. & Geary, D.H., A gradual morphological transition during a rapid speciation event in marginellid gastropods (Neogene; Dominican Republic)	222
11:20a	Crampton, J.S., Morphometric description of cosmopolitan Early Cretaceous inoceramid bivalves	72	4:00p	Rice, S.H., The evolution of gastropod shell form: a developmental model illustrating the roles of heterochronic and non-heterochronic changes	245
11:40a	Macleod*, N. & Rose, K., Functional comparisons among modern and Paleogene mammals based on quantitative analyses of skeletal element outlines	194	4:15p	Staley*, A.W., Geary, D.H., Muller, P. & Magyar, I., An iterative evolutionary pattern in the gastropod genus <i>Melanopsis</i>	276
12:00p	Stevens, W.P., Hierarchical factor analysis and the derivation of phylogenetic skull shape characters in canids	281	4:30p	MacKinnon, D.I., Patterns of loop development in post-Paleozoic terebratulid brachiopods and their evolutionary significance	192
13. MORPHOLOGICAL EVOLUTION					
Dining Room E					
<i>G.E. Boyajian and R.D.K. Thomas, Presiding</i>					
1:45p	Thomas*, R.D.K. & Reif, W.-E., A design space for animal skeletons: implications for patterns of macroevolution	291	4:45p	Sumida*, S.S., Lombard, R.E. & Berman, D.S., The atlas-axis complex of the Late Paleozoic Diadectomorpha and basal amniotes: defining the primitive condition of the atlas-axis complex of amniotes . .	283
2:00p	Landman*, N.H., Tanabe, K., Weitschat, W. & Mapes, R.H., Ontogenetic and evolutionary patterns of septal neck transformation in the Ammonoidea	175	5:00p	Gaudin*, T.J. & Turnbull, W.D., The stapedia morphology of the Xenarthra and its implications for higher-level mammalian relationships	107
2:15p	Boyajian*, G.E. & Lutz, T., Evolution of biological complexity: a case study of ammonoid sutures	32	14. BIOMOLECULAR AND ISOTOPIC PALEONTOLOGY: AN INTEGRATED APPROACH		
2:30p	Zaslavskaya, N., Evolutionary trends and facial control of Chitinozoa	326	Lecture Hall II		
2:45p	Carter, E.S., A new phylogenetic lineage (Radiolaria) from the uppermost Triassic of the Queen Charlotte Islands, British Columbia . . .	53	<i>J.D. Hudson and J.M. Hayes, Presiding</i>		
3:00p	Mitchell, C.E., Homosyndromes in planktonic graptolites: implications for reproductive biology, population ecology, and macroevolution	215	8:15a	Introduction	
3:15p	Heaney*, M.J. III & Yancey, T.E., Origin of the Bakevelliidae, evolution of the multivincular ligament and implications for the Mesozoic bivalve radiation	125	8:20a	Hudson, J.D., The Oxford Clay: a paleontological laboratory	139
			8:40a	Anderson*, T.F., Popp, B.N., Ho, L.Z. & Williams, A.C., The carbon and oxygen isotopic records of fossils from the Lower Oxford Clay .	7

9:00a	Kenig, F., Popp*, B. & Summons, R., Origin and alteration of organic matter of the Oxford Clay Formation (U.K.) determined from bulk geochemical analyses	163
9:20a	Kenig*, F., Hayes, J.M. & Summons, R., An isotopic biogeochemical study of the Oxford Clay Formation (U.K.) . .	162
9:40a	Belin*, S. & Kenig, F., Relationships between depositional conditions and microtextures in the organic-rich Lower Oxford Clay sediments	24
10:00a	Martill*, D.M., Duff, K.L. & Bown, P.R., Trophic structure of the Lower Oxford Clay	200
10:20a	Westbroek, P., The coccolithophore <i>Emiliana huxleyi</i> and global climate . . .	309
10:40a	Hooker, J.J., Van Bergen*, P.F., Singer, R.L., Collinson, M.E., DeLeeuw, J.W. & Jones, T.P., Reconstruction of Tertiary palaeoenvironments using a combination of molecular and conventional palaeobiology	134
11:00a	Taylor*, D.W., Moldowan, J.M. & Hickey, L.J., Investigation of the terrestrial occurrence and biological source of the petroleum geochemical biomarker oleanane	286
11:20a	Showers*, W.J., Genna, B., Barrick, R.E. & Fischer, A.G., A new method for the determination of the $\delta^{18}\text{O}$ composition of bone phosphate: applications to the thermal physiology of vertebrates	269
11:40a	Barrick*, R.E., Showers, W.J., Fischer, A.G. & Genna, B., The thermal physiology of the Dinosauria: direct evidence from oxygen isotopes	17
12:00a	Kolodny, Y., The isotopic record of oxygen in phosphates of fossil fish— Devonian to Recent	171

15. PALEOECOLOGY

Lecture Hall 2

L.C. Anderson and P.W. Skelton, Presiding

1:45p	Anderson*, L.C., Geary, D.H., Budd, A.F., Nehm, R.H., Johnson, K.G. & Stemann, T.A., Palaeoenvironmental control of species distributions in Neogene invertebrate taxa of the Dominican Republic	6
2:00p	Hubbard, D.K., Where's the reef?: a critical reevaluation of the role of framework	138
2:15p	Burke*, C.D. & Mazzullo, S.J., Biotic and sedimentologic comparison of patch reefs on the north and south shelf of Belize, Central America	45
2:30p	Skelton*, P.W., Gili, E. & Masse, J.-P., Rudists as successful sediment- dwellers, not reef-builders, on Cretaceous carbonate platforms	271
2:45p	Kauffman, E.G., Villamil*, T., Harries, P.J. & Meyer, C.A., The flat clam controversy: Where did they come from? Where did they go?	159
3:00p	Harper, E., The evolution of bivalves' defences: constraints and preadaptations	120
3:15p	Rindsberg*, A.K. & Pashin, J.C., Ichnology of a reworked strandplain complex: Mississippian Hartselle Sandstone of Alabama	247
3:30p	Zell*, P.D. & Cuffey, R.J., Early Ordovician assemblages and their possible relation to communities and biofacies—with an example from the Nittany Dolomite of central Pennsylvania	327
3:45p	Johns, R.A., Comparison of Ordovician lithistid sponge communities in the Great Basin	150
4:00p	Kauffman, E.G., Meyer*, C.A., Villamil, T. & Harries, P.J., Pseudoplankton: hitch-hikers through time or stuck in the mud? . .	157
4:15p	Miller*, K.B. & West, R.R., Chaetetid skeletons as short-term records of physical disturbance events	212

4:30p	Fields*, P.F. & Taggart, R.E., Paleoecological affinities of selected Miocene megafossil taxa from the northern intermountain region based on palynological modeling	96	10:00a	Young, G.C., Paleobiogeography of Devonian vertebrates	322
4:45p	Beerbower*, R., Olson, E.C. & Hotton, N. III, The early development of tetrapod herbivory	21	10:20a	House, M., Palaeobiogeography and evolution of Late Paleozoic ammonoids	137
5:00p	Bocherens*, H., Fizet, M. & Mariotti, A., Is collagen from teeth or bones equivalent for isotopic (¹³ C, ¹⁵ N) diet investigations?	30	10:40a	Kelley*, P.H., Sablock, P.E., Raymond, A. & Isaacson, P.E., Biogeographic analysis of middle Visean articulate brachiopod genera .	161
*****			11:00a	Raymond*, A. & Metz, C., Vascular land plant diversity in a biogeographic context	241
UNIVERSITY OF CHICAGO CENTENARY PLENARY-PUBLIC LECTURE Simpson Theater			11:20a	Belasky, P., A biogeographic approach to estimating paleolongitude of suspect terranes in tectonic reconstructions of the Pacific region	23
6:00	Horner, J.R., Dinosaur behavior and -7:00p growth	135	11:40a	Ziegler*, A.M. & Gyllenhaal, E.D., Permian phytogeography and climate	329
*****			12:00p	Rowley, D.B., Phanerozoic reconstructions: What and how do we know it	253
COCKTAILS and CONVENTION DINNER Stanley Field Hall			*****		
7:00p			PLENARY LECTURE Simpson Theater		
-10:00p			12:45p	Gould, S.J.	
———— WEDNESDAY JULY 1 ————			-1:15p		
16. PALEOBIOGEOGRAPHY: GLOBAL CHANGE AND EVOLUTION Simpson Theater <i>R.E. Crick and A. Raymond, Presiding</i>			*****		
8:15a	Introduction		17. PALEOBIOGEOGRAPHY: GLOBAL CHANGE AND EVOLUTION, continued with contributed papers Simpson Theater <i>K.W. Flessa and C.C. Johnson, Presiding</i>		
8:20a	Hughes*, N.C. & Jell, P.A., Cambrian trilobite faunas from India: a multivariate and computer-graphic reappraisal and its paleogeographic implications	141	2:00p	Maples*, C.G., Waters, J.A., Lane, N.G. & Hou H.-f., Paleobiogeographic significance of Famennian echinoderm faunas from northwestern China	197
8:40a	Jin, J., Origin of the Late Ordovician <i>Lepidocyclus</i> brachiopod fauna in North America and its biogeographic significance	149	2:15p	Yao, J., Global Jurassic floras and climate	320
9:00a	Crick, R.E., The biogeographic nature of Paleozoic nautiloid cephalopods . . .	75	2:30p	Bhalla, S.N., Paleobiogeography of Jurassic foraminifera from central Kutch, Western India	28
9:20a	Crame, J.A., Evolution of high-latitude biotas	71	2:45p	Russell, D.A., China and the lost worlds of the dinosaurian era	257
9:40a	Klapper, G., Biostratigraphy and biogeography of Frasnian, Upper Devonian conodonts	166			

3:00p	Johnson, C.C., Cretaceous Caribbean paleobiogeography: a comparison of the generic and species distributions of rudist bivalves in light of dispersal versus vicariance biogeography	152	9:40a	Collins, L.S., Timing of environmental change in Caribbean shallow waters relative to the closure of the Tropical American Seaway: evidence from benthic foraminifera . . .	67
3:15p	Young, K., Migration of exotic species of ammonites during highstands of sea level	324	10:00a	Budd, A.F., Stemann, T.A. & Johnson*, K.G., Late Cenozoic turnover in the Caribbean reef coral fauna	43
3:30p	Markwick, P., Fossil crocodylian distributions, Upper Cretaceous to present: implications for paleoclimate . .	198	10:20a	Cheetham*, A.H. & Jackson, J.B.C., Speciation and diversity of Caribbean Neogene to Holocene cheilostome bryozoans	55
3:45p	MacLeod, N. & Keller*, G., Biogeography of the Cretaceous/Tertiary planktic foraminiferal faunal transition	193	10:40a	Jackson*, J.B.C. & Jung, P., Molluscan diversification and extinction on opposite sides of the Isthmus of Panama	144
4:00p	Fredericksen, N.O., Differing histories of Eocene angiosperm diversity in eastern North America and western Europe: dependence on paleogeography	105	11:00a	Allmon*, W.D., Portell, R., Rosenberg, G. & Schindler, K., Species diversity of Pliocene-Recent mollusk faunas of the western Atlantic: implications for climatic history	4
4:15p	Flessa*, K.W. & Jablonski, D., Biogeography of Recent marine bivalve molluscs: implications for the geography of extinction	99	11:20a	Collins, T., Rates and patterns of molecular evolution in marine animals following the Isthmian emergence	68
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